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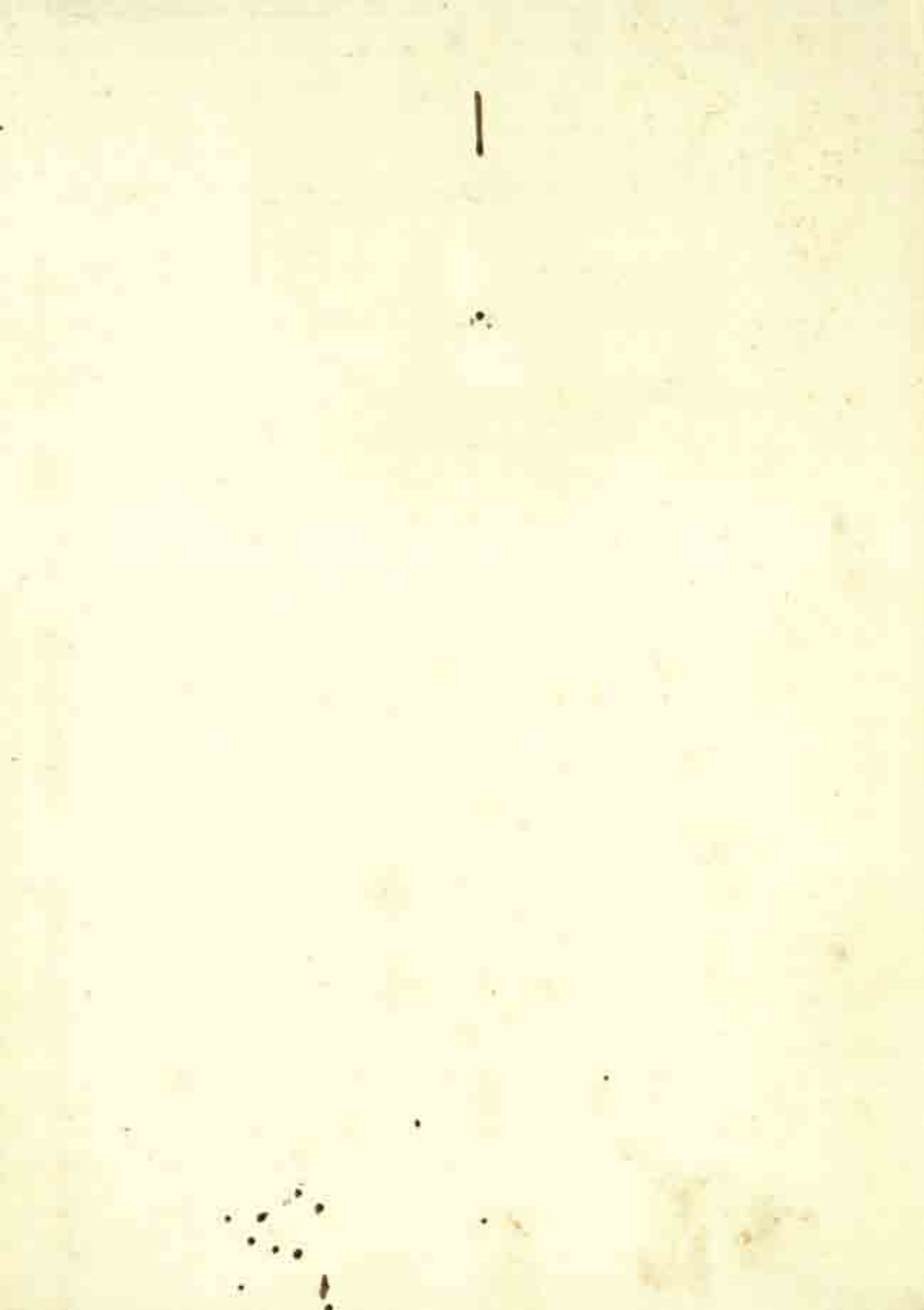
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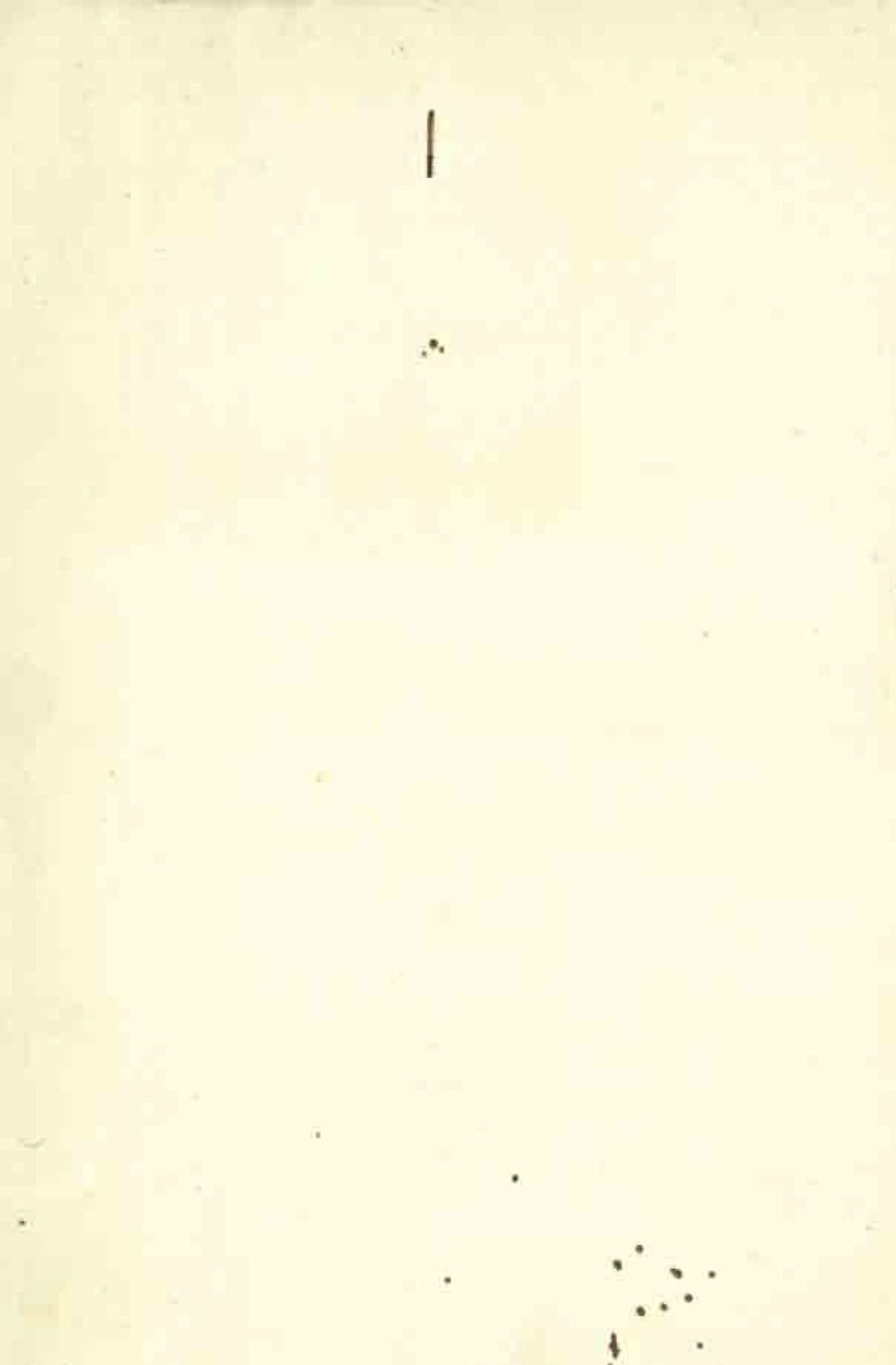
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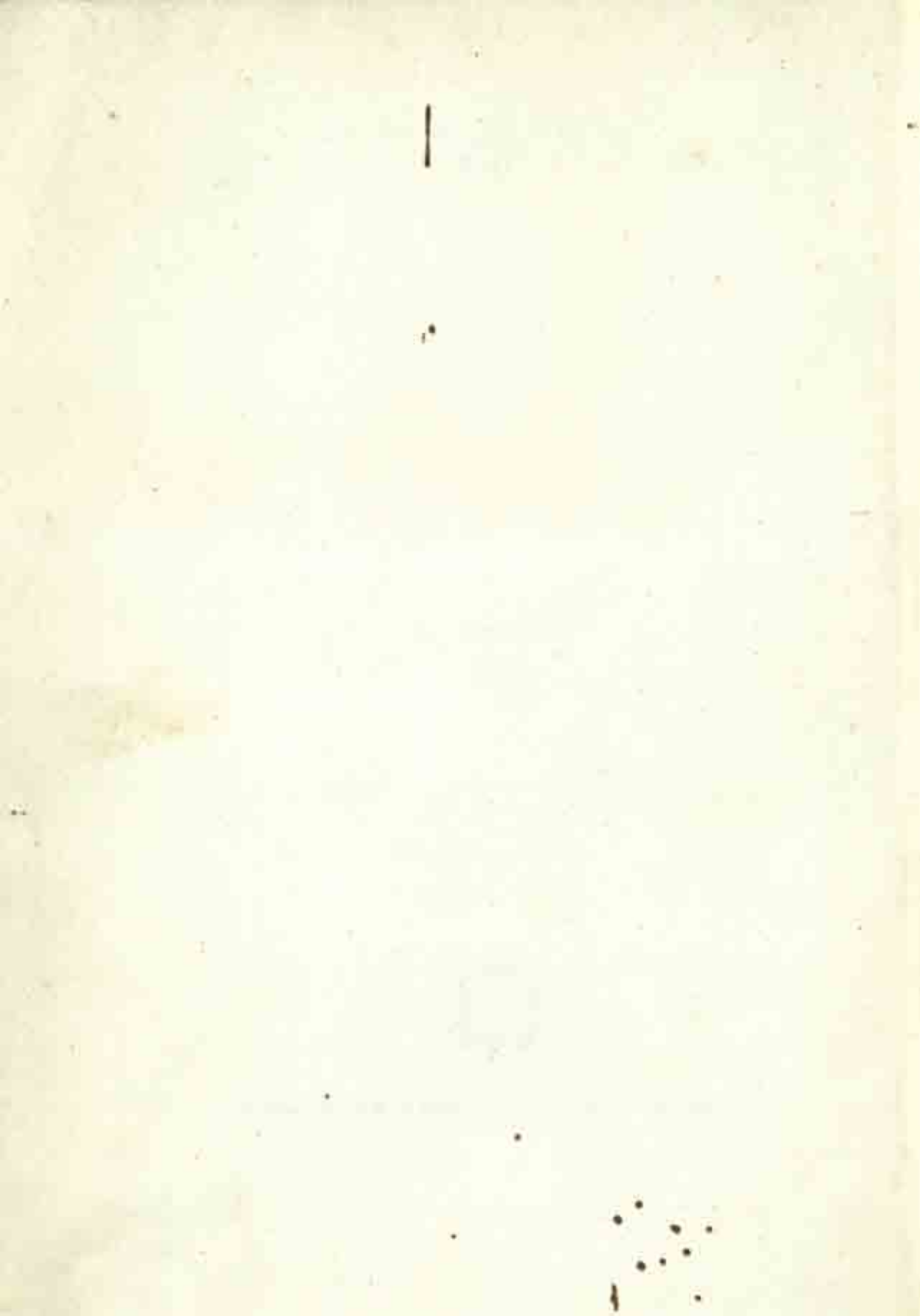




THE MOUNTAIN | WORLD
1955



SWISS FOUNDATION FOR ALPINE RESEARCH



THE MOUNTAIN WORLD

1955

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IN CONCURRENCE WITH CHIEF-EDITOR MARCEL KURZ

First published in 1955

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PREFACE

Each year it becomes more and more difficult to sort out the flotsam that drifts upon the rising flood of life. It is therefore once more the object of this book of exploration and mountaineering to give a deeper significance to individual acts of human daring than can be given by the passing attention of newspapers and periodicals. On the other hand an annual publication is forced to base its compilation of events on too wide an angle of vision. But occasionally there is narrowing of this angle with the effect of detaching itself completely from individual efforts and emphasising instead a characteristic of our own epoch.

One of the questions we have examined is the reason why individual accounts of mountaineering adventure are becoming increasingly rare as compared with impersonal professional reporting. Partly responsible is an actual fear on the part of the individual participant of expressing his real feelings concerning the hardships of the daily task: also responsible is the arrival in the field of large expeditions and their concomitant array of experts. Owing to this remarkable lack of courage on the part of the individual to express himself, mountain literature has been largely deprived of one of its best characteristic features. The need to examine this problem to the benefit of the younger generation of climbers has called forth the views and the friendly encouragement of Geoffrey Winthrop Young.

On the other hand, a veritable avalanche of reports and announcements from the field has made it necessary for us to allow the familiar "Himalayan Chronicle" by Marcel Kurz to mature slowly. But we can at least include a concentrated extract of the comprehensive chronicle—which will be published later—as a foretaste of the events of the year. For although this book does not set out to announce events before they actually happen, the annual review gains in lucidity if a sketch of the most important of them is given.

Like the scalp at the belt of an Iroquois, modern documentary evidence in the form of a pose on a beflagged summit would seem to be a "must" among the

booty of every budding Marco Polo of the mountains. This custom probably has its origin in the doubt that was cast on the authenticity of the photograph taken at the summit of Annapurna; therefore, on Nanga Parbat, Everest, Cho Oyu and K2 great care was taken to include part of the surrounding country in the picture in order that conclusive evidence could be produced, if necessary, by means of map bearings. For the disparaging voices refused to be stilled and as a horrible example of this tendency it is only necessary to mention the anglophobe book by S.M. Goswami. The result of all this was to start a rumour which spread like a stream of mud from the Karakoram down to the Punjab that the Italians had not climbed K2, nor had an Austrian reached the summit of Nanga Parbat, and that furthermore the Mir of Hunza was ready to make an official complaint. Is it really necessary that a statement should be sworn before a commissioner of oaths in order to guard against common cheating?

As though the modern age had stirred up the mountains and the happy people who dwell therein, sudden disturbances have swept through certain valleys like thunder squalls. Last year the polite Japanese suffered severely from this trouble on the occasion of their third visit to Manaslu, and after dark references to crop failure and epidemics as a punishment from the gods, they were threatened with physical violence, reviled as "heathens" and driven away. This episode is worthy of mention since it bears witness to a certain uneasiness aroused in the mind of the local population by the ever-increasing exploration of the Himalayas. At the same time it must be stated that the "backwoodsmen" are being urged to moderation by their own ruling classes, for in Kathmandu such events are regarded more dispassionately; in fact, with an unmistakeable economic flair, they have made a virtue of necessity. The enraged and superstitious people have been appeased; the lamas of Manaslu have promised discipline, liaison officers have been appointed to the expeditions by the authorities and everything is being done to counter the threatened shortage of coolies and high-altitude porters. With the demand for 5000 porters for 11 expeditions in 1955 in Nepal alone, Kathmandu hopes for a favourable influence on its "trade balance", in that increased demand, coupled with rising coolie wages, will lead to a considerable influx of Indian rupees.

Seen from the standpoint of the "historic" expeditions, the post-Everest era, which would scarcely seem to have begun along the right lines, assumes the aspect of a "throng before the crib". Mutual toleration within a tradition-bound community has given place to a free-for-all, wherein men seek to pick the laurels from the trees which others thought to have planted for themselves. A suggestion has been put forward to counteract this fall in moral values by means of an international clearing house—although the root of the trouble might be in a

shortage of nurseries! For where a sense of decency is lacking, a proposition raised to the status of a law can at the best mitigate the complaint but not cure it.

Do economic measures and the unravelling of a social order which has got out of control really uphold a standard or sustain morale? Cannot the threat of upheaval within the narrow limits of a backward feudal society be explained by a too rapid advance from the middle ages to modern times, with the consequent smoothing out of all contours and the extinction of all social values in exchange for the ant heap? It is the same, perhaps, with mountaineering.

Although upon this background light and shadow may alternate as on an early May morning, or while one waits to see if the veil will lift from the picture of Sais (if indeed it has not already become as rigid as an iron curtain), each halt involves a *tour d'horizon* whether one will or not. Nevertheless the stage will come to life again to the barely suppressed clamour of time's servants, for the play remains young even if the audience grows old.

In this modest summary of the year's events some features bear the imprint of a certain style. The onlooker regards the individual expression as a piece of evidence equally deserving of examination. He will judge for himself whether he will award the palm to the large expedition that recently reached the summit of K 2 after years of effort, or whether he will respond to the inspiration emanating from the monastic vision of a veritable pilgrimage to Cho Oyu. The era of the post-golden-age of mountaineering is framed as in a picture by the characteristics of these two adventures.

This 10th volume of their Year Book invites the Swiss Foundation for Alpine Research to pause awhile and reflect. Now is the time to express thanks to those men who have carried the torch from the beginning, and, ever closing their ranks, have by intention and deed shown the way along the narrow ridge which divides the dark abyss.

O. G.

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COURAGE, AND MOUNTAIN WRITING

By Geoffrey Winthrop Young

Some fifty years ago a few of us enthusiastic younger mountaineers began to question whether the whole truth had ever been written about a mountain climb. We had a profound veneration for our elders, the Alpine pioneers; but it seemed to us that, in the famous books which first proclaimed mountaineering to the world, they had been inhibited by the repressive conventionalism of the nineteenth century, from revealing the full range of feelings awakened by the greatness of mountains. They suppressed their reactions when writing, or they disguised them under one or other of the more acceptable categories—scientific, religious, sporting or jocular.

After many talks over Alpine camp-fires, C. Donald Robertson, a fine mountaineer and a man of remarkable ability, wrote a paper for the *Alpine Journal* on Alpine Humour; which appeared simultaneously with the notice of his death on a precipice in Wales. One sentence has often since been quoted: "The matters of common knowledge in mountaineering are the emotions which form its very flesh and blood. . . . But, until men are found to say, and say with seriousness, what they pluck from danger and discomfort, to say, and say in full, what they have found of beauty and delight, we shall not have an account of a climb which those who have shared the experience will acknowledge to be no more and no less than the truth, and those who have not, will accept as a worthy vindication of our creed."

More than in histories of campaigns or battles, it is essential that, in the history of a climbing day, the actual reactions and feelings of the climbers, in relation to the details of the difficulties they encountered, should be reported. Because, in great mountaineering, the result, the reaching of a summit, is of minor importance; but the pleasure, the discipline, the whole merit of the climb, depend upon the way it was done, that is, the method, behaviour and mental attitude of the climbers during the ascent, the descent, and the whole long day. The result of a climb is negligible, the satisfaction in it soon passes; but the process is vitally important, because its human effect will be lasting.

In a foreword to *On High Hills*, a book which appeared during this crusade for a better representation of our ruling passion, I wrote that the difficulty of

describing ascents adequately, lay in the necessity of keeping three different threads going at one and the same time, in order to give the reader a complete impression of a climb: firstly, a clear picture of each scene, as a background to each incident; secondly, an intelligible technical description of each climbing incident as it occurred; and thirdly, the simultaneous reactions of the climber to the incident, described in such fashion as to bring the reader into the atmosphere of the ascent at the time, into its suspense, alarm, or relief. It is not the easiest of techniques. It means that a sequence of separate scenic pictures, and of separate incidents adjusted to those pictures, and of succeeding changes of mood to act as captions to the incidents, have all to be brought into a smoothly running narrative, as in a talking film, with no joins visible or mental jolts for the reader. This involves trouble and careful revision. So does every book that is intended to be read with pleasure, and to survive longer than a temporary article in a magazine.

Beginning from this period, a number of well-written and therefore readable books appeared, which fulfilled these conditions. In some of them, the strong personal touch or style was able to give such illumination to the scenic descriptions and to the incidents, that the failure to picture also the impressions made upon the author as climber, was hardly noticeable. I can mention here only a few excellent books, by past authors, that come back to mind when I am far from a library:—Kugy's and Guido Rey's recollections; the memoir of the Zsigmondys; 'Empor' the Winkler memorial; Andreas Fischer's essays; Charles Gos's studies; and in my own country, Mummery's climbs; Slingsby's Norway; Norman Collie's and Conway's romantic writing.

Time has gone on; and the discontent with mountain publications seems to be repeating itself. But the limitations now are different, and their causes are very different. Mountain literature is now criticised, not because of its repressions, but because it is found less readable. Ought we to attribute this to some defects in the writing? Or to a definite change of taste in the public that reads climbing books? It is probable that both are responsible.

Early in this century mountain books were still being written principally for mountaineers, a limited clan; and mountaineers were those who had the leisure and the money to travel. They belonged chiefly to the academic and learned professions, and had educated tastes. There were also the instinctive lovers of mountains, including the elderly ladies who sketched whole alpine panoramas or stayed awake at night over climbing adventures, without ever themselves being able to climb. For this special public, the first and simple narratives of early Alpine ascents, with their gradual unveiling of the wonders of glacier and snow ridge, a world then still unknown, were all that was asked for. Those of the lay or non-climbing public who glanced at climbing adventures only for the sake of

a new sensation, knew nothing about mountaineering except that a rope had always to be cut, or not cut, and that, when cut it meant a fall as climax. As to what the rope was fixed to, upon which men climbed mountains, no lay man would have been surprised at that time if it was used as Baron Münchhausen used it in his famous descent from the moon. Technical writing had still no meaning. To some extent, however, journalists seized the chance of a new sensation, and since mountain risks were still obscure, they had to fill up the stories with a strong love interest—a heroine in high heels and a fringe, a sunburnt but reckless hero, a crevasse on a rock summit unknown to the guide, and the rejected lover and villain with open knife ready to cut the rope. Unhappily for mountain authors, this easy road to favour was closed to them. They had to construct their plot out of the unsentimental but strong attachment of the sunburnt climber, to an icy and inhuman mountain wall.

Time has changed since these simpler days. The risks of climbing are now common knowledge, and the select company of mountaineering readers is no longer in control. In every country, climbers can now be counted by thousands on the hills, where we used to reckon by tens, or even fives. They form, of themselves, a fair-sized reading public; and they are well enough informed to make fun of the cut rope and the summit crevasse, and to expect a heroine, if mentioned at all, to lead the Mummery Crack. They are greedy for technical details, and for reports about peaks and precipices which they themselves have climbed or intend to climb. Since custom, and an easy approach by car, rail and aeroplane have now deprived their homeland hills, and the nearer Alps and Pyrenees, of the qualities of surprise and novelty, and of the mystery that once enveloped every great summit, they form a reading public that is suspicious of sentiment and of all picturesque writing. To the young scientific mind in this "machine age", the muscular movements in climbing are mechanically explicable, and therefore sympathetic when described. But the emotions implicit in mountaineering are much less calculable; they complicate the pure acrobatics, and provoke too much thought. These climbers ask only for facts, facts and details. Details make a solid groundwork for the feet, and facts for the mind. Of the thousands who now go off, most healthily, every week-end to climb on rocks and cliffs, for the sake of the physical satisfaction and sense of well-being which this admirable exercise gives to the mechanism of their bodies, only a limited number have ever given themselves the chance to experience the enchantment of long days of effort high among the great peaks, or the benefits which these may confer upon mind and spirit. Never-the-less, such climbing is a wholesome practice, and we may be glad that so many pursue this way of health. But, in so far as they constitute a reading public, their limited preferences do not help to produce good mountain literature.

The modern lay public is now ready to read mountain adventures among its other sensational reading. It still demands excitement all the time. The cut rope is no longer essential, and the blonde heroine has less appeal, now that she has to climb in nailed boots and slacks. It wants records, above all. Records in height, records in endurance, hair-breadth escapes on record rock walls, and a seasoning of injuries, blizzards, losses of limbs and hazards of life. No doubt, there is still the proportion of lay readers who appreciate style, and who read mountain books when they are readable literature; probably there are as many as there ever were. But their praise, or criticism, is unheard, in the increasing mass of those who, in their tens of thousands, are eager to read mountain stories if only the records are high enough and the crises numerous and thrilling.

I have suggested that the writers and producers of mountain books must also take some of the responsibility. There are new factors now at work which dictate the character of the writing, quite apart from the influence exerted by a changed reading public. The type of climbing adventure itself has changed. Our nearer mountain ranges having been explored, and their climbs become comparatively familiar, the borders of the Unknown—with its irresistible fascination for good mountaineers—have been removed far away. The distant ranges are having their turn, Andes, Himalaya, Karakoram, Pamir and so on. These connote exploration and expeditions, supply and outfit, on a very different scale, and necessarily include specialists of several kinds. Consequently, their several reports and inclusive summaries grow more and more like the impersonal annual reports of learned societies. The whole character and composition of such parties make this inevitable. These serial and factual recordings, however, while they have great interest for those who were of the party, and importance for those who know the localities or who propose to go there later, can rarely have durable value in the literature of adventure. Of their nature, it is all but impossible to make them readable by a lay public, if they have not the good fortune to embody a record ascent, or a notable peak, or a sufficiency of sensation. Modern photography with its vivid illustrations of strange places and faces does much to make the texts palatable. But the problem is now recognised; and I have little doubt that the best solution has already been found, in the inclusion among the party of a competent writer, whose duty it is to complement the official report with a personally coloured, humane and therefore sympathetic version of all that happened.

Individual climbers, writing of their lesser mountain ventures, remain free to write in their own fashion. A number who have written recently of rock-climbing exploits, have produced books with a personal style and of enduring value. But the majority of writers of such records are too modest, or too mistrustful of their

own powers. Club journals are filled with matter relying on the old clichés, the old quotations, the old jokes, the old sentimental turns of phrase, which were novel sixty years ago and have done unflinching duty ever since.

The book-reviewing is apt to be equally discouraging. We may glance through scores of mountain journals and the notes upon books recently published, and find not one reference to the literary merit, the style or the lasting value of any book: factual content alone receives comment.

Again, production has now become so costly that, upon financial grounds alone, an unknown author can seldom hope to have his story accepted for publication, unless it contains some special or sensational features: record heights attained, or fearsome incidents and sufferings endured. It is only those meritorious firms who discriminate, and who are content with small returns so that they may continue to produce a proportion of books of literary quality, who are responsible for maintaining the standard of readable excellence in mountain literature.

These are the principal reasons why we should feel no surprise—although we may feel some regret—that mountain writing at the present time has more quantitative than qualitative merit, and is usually of only ephemeral interest. It ought not to be so; and the exceptional books occasionally encountered are a proof that it is still possible to write about the most familiar peaks and wellknown ascents in a way that holds the reader's interest and kindles his imagination. A young mountaineering author has of course the courage of his convictions; but he should also have the courage of his emotions. If he is to be read by human beings, he must write his adventures exactly as he himself humanly saw them at the time. General or objective description, such as satisfied the slower timing of the last two centuries, now reads too slowly, and is dull.

Our thoughts and personal impressions, even of mountains, can never be precisely represented by our words. Words distort, slightly, or considerably. The first words that come to mind usually distort considerably, because they are the epithets, the echoes of phrases, remembered from some one else's description of a similar scene or similar incident. If we leave our writing at that point, our story will be derivative and commonplace; and if we re-read it after an interval, we may be surprised to discover how little these first-come phrases reproduced our real thought, or represent the scene as we saw it, to a reader. A description may have to be rewritten several times, before it rings true to the picture in our mind. Often it may be the most unusual word, coming to mind at the last revise, which at last says exactly what we mean.

Our relationship with our mountain is a personal one; and we should none of us mountaineer unless we had a personal feeling in favour of the practice. In Britain we are supposed to learn to control our reflexes; and there is among us

an element of modern climbing critics, of the all-for-technique school, which believes it ought to condemn any writing that is not technical and impersonal, as sentimentality, a superfluous display of emotion. This is an odd confusion. Sentimentality implies the introduction of inappropriate sentiment; as if the relationship with a mountain were described in terms appropriate to affection for a daughter, or a fiancée. Our feeling for mountains is wholly different: it is austere, tense, and only romantic in the sense that chivalry was romantic. I should describe it in terms appropriate to the relationship between the Knights of the Round Table, who were brothers in arms, but ready at every instant to fight one another on the field of honour. Admiration, aesthetic appreciation, enthusiasm, all belong to this sentiment of chivalrous antagonism as we feel it for the mountains. I have no doubt that David was eager to pay his tribute of wonder to Goliath's height and his splendour of armour, when he set out to combat with him; as we might also exclaim—or write—in admiration of our glaciated peak. It is the mountain nowadays which can hurl the stones, and not David; but it is the mountain also which now survives, in all its noble panoply, every one of our ascents:—ascents which foolish people call "conquests", as though they had cut off and carried away the mountain's head in triumph, when they have climbed to it.

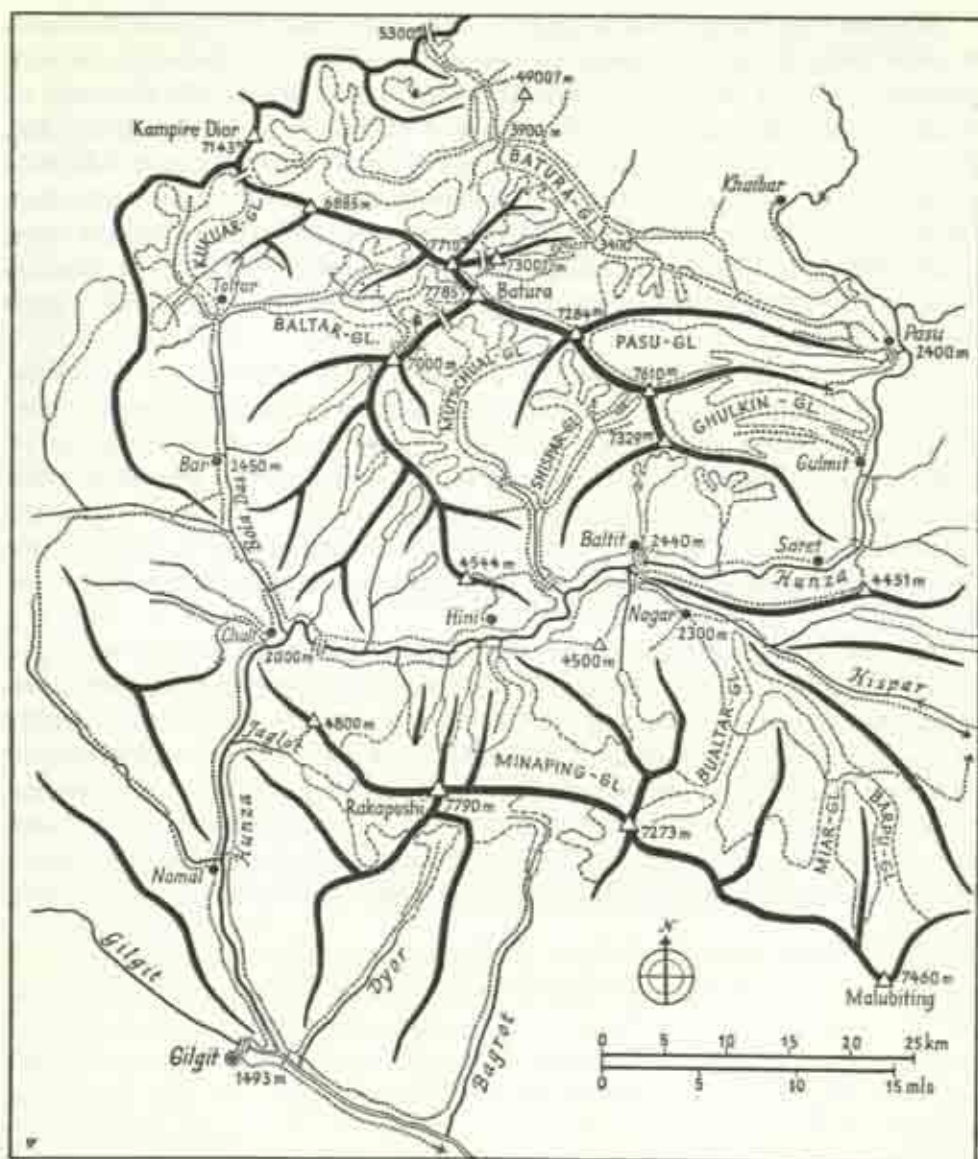
In some countries other than Britain our relationship with mountains is equally misinterpreted, but at the opposite extreme. Young writers there are expected to romanticize their climbs, to invest them with the language of the human affections; so that at times we find ourselves reading echoes of the great poets, extracts from the artists or psychologists, often with a sound as familiar as churchbells and as distracting to the narrative. But this drapery of passionate and romantic writing is as little appropriate to our austere relationship with mountains, as is the bald, factual chronicle demanded by their opposites, the climbing technicians.

The true version of a mountain climb lies between these extremes. It can reproduce the exciting or depressing atmosphere without ever approaching sentimentality or the pathetic fallacy; and yet retain the colour given by the writer's personal feelings, as incident followed incident and the changing scenes of beauty were revealed. However well-known the peak, or the line of ascent, no mountain story need ever repeat itself, or seem monotonous. Both mountain surface and mountain climber vary from year to year, even from day to day. A different composition of the party, a different mood in the writer when climbing, must give to the story of every ascent a different character and coloration. I have been up one Alpine peak eight times; and although the details of the ascents were the same, the personalities of my companions, the states of weather and surface and the fluctuations of mood were so diverse, that the accounts of the days, if written down veraciously, would have made very unlike reading.

No man with energy great enough to climb, and a mind lively enough to wish to write about it, has any excuse for writing a dull book. If he remains a rock gymnast, his book will be an acrobatic record; but if he will take the pains to recall, and to write, exactly what his rocks were like, and how they impressed him, and uses words which are his own and which reflect himself, then it will be a readable book, and may stand the test of time. If he is a mountaineer, and makes real ascents, he has an even better opportunity; because every range, almost every peak, has its own distinct personality; and this, in conjunction with the personal point of view of each different climber, gives an endless variety to stories of high mountaineering.

Mountains will always remain the largest objects of beauty on the globe. There are enough of them to inspire mountaineers for untold years to come. It would be wrong that those who at the present time have the happiness of making the first explorations, should not do full justice in their records, to their greatness as we now see them, and to their infinite variety. An artist of mountains will devote his whole skill to painting them as they are. A writer has a greater opportunity: he can picture them not only as they are, but also tell of their effect on man.

Let him take courage, and write *himself* into his story. He is not writing a lifeless scientific treatise. Wherever human beings are concerned, as they are in mountaineering, the writing, if it is to be true at all, must be human and personal; or it will soon die of dry detail, and be forgotten. As soon as the first effervescence of youthful enthusiasm has worked itself off in his purple passages, a mountain writer, by constant revision, will find that he can get down to the most direct and veracious expression of what he himself saw, of what he did, and of what he thought by the way during a climbing day. If this is his book, he will be read, and re-read.



Sketch map of the Austro-German Karakoram Expedition 1934. Dotted lines indicate the routes taken. The scene of the fatal accident to Karl Heckler in the Hunza River east of Saret is shown by a f.

GERMAN-AUSTRIAN KARAKORAM EXPEDITION 1954

I. THE CLIMBING PARTY. *By Mathias Rebitsch*

The object of the expedition was the mountaineering reconnaissance and scientific investigation of a portion of the Western Karakoram Range, as yet only partially explored, involving the co-operation of a climbing and a scientific party. We also wished to make a first ascent of a high peak in this area as a sort of alpine "bonne bouche".

We received moral and material support from the German Alpine Club, the German Himalaya Foundation, the German Society for Exploration and the Austrian Alpine Club.

We were inspired to go to the Karakoram by the works of Dyhrenfurth, Visser, Tilman, Kappeler and Gyr.

I was appointed head of the expedition and leader of the climbing party, my deputy being Dr. Wolfgang Pillewizer, who was also in charge of the scientific party. The climbers were as follows: Anderl Heckmair (one of the party that made the first ascent of the north face of the Eiger), Gerhard Klamert, Martl Schliessler, Hans Zeitter and Dolf Meyer. The names of the scientific party are recorded in the contribution by Dr. Pillewizer. Our M.O. was Dr. Paul Bernett, also a climber. Eugen Schumacher was entrusted with the task of making an Agfa colour film of the expedition.

Our equipment had to fulfil many requirements. After months of preparation, the textile equipment was finally made of Perlon fabric which was both light, untearable and heat retaining. It proved excellent in every way. As regards food supplies, we chose a middle course between the well-known tinned foods and vegetable products. This also proved to have been the best course.

On May 22nd our aircraft touched down on the sandy runway at Gilgit. We were the guests of the political agent, who was a veritable father confessor and tower of strength in time of need and who also chose our Hunza porters for us. We were especially indebted to the Pakistani Government. In Gilgit we were joined by Captain Shan Khan and Mr. Daud Beg of the Lahore Karakoram Club. Up to the moment everything had gone according to plan but now a series of

misfortunes befell us which seemed never ending. I was confined to bed in Gilgit with a severe attack of bronchitis and dysentery just when the vital decision had to be taken concerning Rakaposhi (25,545 ft.).

The aim and object of the first two reconnaissance parties was to examine the possibility of its ascent on the south side from the Dyor and Bagrot valleys. The combined opinion was as follows: "Too exposed to avalanches for the safe ascent of porters." Whether this danger was likely to be less later on in the season was uncertain, anyway I could not accept the risk.

Further results of the reconnaissance were: the neighbouring peak of Diran, 7273 m. (23,855 ft.), could be climbed from Hinarche (W.S.W.) over steep ice-slopes and along the west ridge in June or July. The chain of the 6000-m. (19,680 ft.) peaks of the Bagrot Massif to the east ends to the south in a perpendicular cliff. We could see that it might be possible to climb Malubiting (24,465 ft.) in a north-to-south direction over ice-ridges. The rocky summit of Dubani (20,150 ft.) would also appear to be accessible over some not very difficult but dangerous ice-falls.

In the meantime, an expedition from Cambridge, which included the Swiss Alfred Tissières, had arrived at Gilgit. Its attempt on Rakaposhi via the south-western arête was the route taken by the first expeditions of 1938 and 1947. They had precedence over us and, as the requisite permission for Distaghil Sar (25,865 ft.) had still not arrived, we determined to go elsewhere and followed in the wake of the scientists who had already gone to the Baltar Valley, where there were a number of nameless 7000-m. (22,960 ft.) peaks. A recent and very daringly constructed jeep track runs for some 40 km. (25 miles) to Chalt, whence we departed for the valley of the Bola Das River. We were accompanied by our fifteen Hunza high altitude porters and Nagar coolies.

Leaving the green and fruitful oasis of Chalt we wound along the barren stony bed of the Bola Das with its grey muddy water. The further we penetrated into this inhospitable valley the more desert-like it became. It was narrow and deeply cut, with its slopes parched and lifeless; and far away in the distance shone the snow-caps of the main mountain chains. The local flora, buried beneath a layer of scree and detritus, was burnt up by the sun, the whole landscape cried out for water and the only plant life capable of any existence at all spread out thinly along the narrow water courses. The Hunza peasants are sometimes able to conduct the milky glacier water from gorges and glacier tongues to the valley floor and terraces by means of aqueducts or leets, thus producing a veritable agricultural paradise. The ripe corn stood behind the semi-circular stone walls bordering the terraced fields, resembling a bright green staircase contrasting vividly with the surrounding desert waste. The small stone and clay huts with their flat roofs hid behind the well-laden apricot, nut and apple trees, here and there interspersed

with vines. Far above gleamed the white crests of the snow mountains. This was the real Hunza country in all its fascinating beauty.

On our first day out we passed through the village of Bar and next day reached the little shepherd colony of Toltar, having traversed a desolate conglomerate gorge over soft and tiring quicksands and hard clay slopes. Away at the end of the valley we could see the dirty tongue of the Kukuar Glacier which was first explored by Gyr, Kappeler, Tilman and Secord in 1947; they followed it to its source. It was time for us to make a comprehensive reconnaissance of the area in order to discover for the climbing party a 7000-m. peak which could be climbed with some degree of certainty. There were in fact a number of not very difficult peaks between 6000 m. and 7000 m. (19,680 ft. to 22,960 ft.) on the ridge to the west of the Kukuar Glacier.

The main party set off to reconnoitre the 7000-m. peaks surrounding the upper Baltar Valley. Here we had a surprise, for on the other side of the huge moraine walls of this glacier we discovered a wide alluvial plain contrasting sharply with the otherwise desolate and desert-like landscape. A primeval birch forest, decayed and thickly overgrown, enclosed open meadowland. Half hidden among huge granite boulders stood the delapidated remnants of a forgotten shepherd colony. Ibex were grazing on the green turf and enormous vultures cruised slowly overhead. This peaceful idyll was the very antithesis of the magnificent surrounding mountain scenery: pointed unclimbable rock peaks, ice-domes with sharp fluted ridges, granite ranges with savage flying buttresses and smooth ice gullies soared heavenward above the soft contours of the birch tops. Here we pitched a camp; Bear Camp, which became a base for an exploration of both branches of the Baltar Glacier. A succession of avalanches thundered down the colossal mountain walls, breaking up into powder and billowing like a cloud over the flat surface of the glacier. I have never seen such a restless mountainside. On several occasions we encountered brown bears, whence the camp derived its name. Fortunately they always ran off so that we only came in actual contact with their tracks in the snow, like those of a giant.

On July 8th we penetrated the remoter of the branches (east branch) of the Baltar Valley to its innermost recesses. At the far end was a rock cirque about 10,000 ft. high; now at last we were face to face with the southern precipices of a real 7000-m. peak, actually 7800 m. (25,585 ft.), a nameless summit of the Batura Chain. The only route up this giant was barred by a series of ice-falls spread across the face and the crossing of a col into the Mutschual Valley was too dangerous. Thus, our hope of finding reasonable access to a 7000-m. peak had come to naught. We also explored the northern branch of the Baltar Glacier but again came up against the same difficulties, namely an ice and granite cirque with no exit.

Klamert, Zeitter and Daud Beg now endeavoured to force a passage over to the Kukuar Valley but found it impossible to descend on the other side. As a consolation prize they climbed a peak of about 18,040 ft. The scientists had fully explored the area and went off to the Batura. We climbers now laid siege to the only peak of between 6000 and 7000 m. which in my opinion could be considered possible and safe. We made three attempts on this mountain which we called the "Wildspitze", but a period of bad weather which put paid to many Himalayan expeditions this summer enveloped the mountain in thick clouds and brought snow down to our camp at 3600 m. (11,810 ft.). This weather continued for nearly three weeks. As soon as it showed any signs of clearing we set out, but every time we were held up by fresh snow and avalanches. The summit party was finally driven off by a blizzard not far from the top, after an extremely difficult and arduous climb up steep rocks. Ice-falls, which till now had been considered quite innocuous and in no way dangerous, suddenly began to cast down séracs. These avalanches fell in totally unexpected places, quite contrary to our previous alpine experience. They poured over our ascending tracks close behind the party and continued down to and over our Camp I in a huge snow cloud, fortunately without causing any damage there. The retreat was on and by good luck was successfully accomplished. Anderl Heckmair, till now quite immune from illness, went down with pneumonia at Saddle Camp. He was able to crawl down to Base Camp, where Dr. Bennett gave him penicillin that probably saved his life. But as an after effect the vision of his left eye was seriously impaired and he had to go home.

At Base Camp one of the Hunza porters lay almost at the point of death with peritonitis and was only saved by the devoted attention of our M.O. Dr. Bennett also performed an operation under the most primitive conditions on another porter who was suffering from an infection of the leg, thereby undoubtedly saving both his leg and his life. Owing to these professional activities, Dr. Bennett was unable to form one of the climbing party. As Klamert periodically had attacks of sand-fly fever with temperatures up to about 105°, the climbing group was reduced to four in number.

During the third attempt on Wildspitze the weather broke up again and all the high camps were evacuated. We now made a desperate effort to cross over into the Hussanabad Valley, bagging a 5400-m. (17,710 ft.) peak on the way. The romantic days of Bear Camp were over, for the summit ridges of Wildspitze were now too corniced and would be inaccessible for a long time. In the meantime we had received permission for Distaghil Sar, 25,865 ft., but it was too late.

Bearing our sick with us, we descended this unlucky valley back to Chalt. Here we feverishly made fresh plans and formed new reconnaissance parties. We rode through the Hunza Gorge for the whole of a long day to the Residence of the Mir of Nagar, a distance of some 44 miles.

Meyer and Zeitter left us at Minapin in order to take a look at Diran (23,865 ft.) from this side and found it could be climbed without any special difficulty. The road to Hunza or Nagar ran along both sides of the river, sometimes cut out of the rock high above it; the track consisted of loose stones without any sort of binding material and clung to the precipice walls in such a way that we often rode hundreds of feet above the Hunza River, its muddy waters racing and eddying towards the Indus. At other times we rode through crumbling conglomerate at the bottom of the huge Hunza Gorge. The sun beat down into this naked gorge like a furnace, paralysing in its intensity. On one side the white glittering ice-wall of Rakaposhi soared up in one bound to a height of 25,585 ft. and on the other side the seventhousanders of Baltit could be seen farther off. It is here that the Hunza River breaks through the ice-wall of the Karakoram in a gigantic gorge. It was the track of the pre-historic trade route to Chinese Turkestan, used by countless mule and camel caravans even before the advent of the Mongols.

Often the gorge widened out to become a "jeep road", bordered by flat terraces irrigated by melt water from the snow mountains; and flourishing villages appeared with golden corn-fields and fruit-gardens in the middle of the surrounding desolation. Here we galloped through village streets lined with apricot-trees whose ripe yellow fruit almost fell into our mouths. The corn was either ripe for harvest or was actually being threshed by oxen plodding slowly round and round. The roof tops were covered with apricots drying in the sun and little mills were busily working all over the countryside.

The houses were closely huddled together almost like a small town and their windowless structures looked like miniature forts. Indeed, bands of alien warriors frequently passed through this frontier zone, for Hunzas and Nagars alike loved playing at war and capturing slaves, which often resulted in bloody encounters.

We reached the white Residency of the Mir of Nagar about midnight, under the magic spell of a full moon. He received us in a most friendly fashion and treated us "right royally". We were his guests for five days and he helped us in every possible way.

Paul Bennett made a lone adventurous trip towards Distaghil Sar, which is the highest peak of the West Karakoram, 7885 m. (25,865 ft.). He reported that it could be climbed but that it would not be easy. It would also appear that there was little hope in the other 7000-m. peaks around the Hispar Glacier.

I went up a high valley above Nagar to a snow-saddle of about 14,750 ft. The summit ridges of the Bagrot Group (19,000-23,000 ft.), so unpropitious from the other side, drop gently down to the Baltar Glacier towards the north. However, I was not able to observe the lower section.

I was on the point of following Bennett with the main party when I received a letter from Dr. Pillewizer as follows: "The highest peaks of the Batura Chain

can almost certainly be climbed from the Batura Glacier. Access thereto should not be difficult. The Mir of Hunza offers every assistance." I made an immediate decision: en route for Batura!

We arrived on July 15th at the Prince of Hunza's bungalow in Baltit, sweating, bearded like the pard and completely unsuited for polite society. We were received by an amiable gentleman, the celebrated Mir of Hunza. He lives in the English style and his walls are covered with pictures of polo matches and sword dances. Behind stood the ancient castle of the Princes of Hunza with its magnificent background of snow mountains. The Mir was exceedingly helpful in every way and gave us his full support.

We continued on our way up the Hunza Gorge, the mountain flanks closed in and became steeper. Suddenly the gorge widened out into three green oases, Saret, Gulmit and Sasaini. The end of the valley was completely blocked by an immense limestone massif; we were nearing the frontier mountains of Chinese Turkestan. The snouts of huge glaciers became visible up lateral valleys and behind Gulmit an ice-crowned mountain chain rose up immediately above the houses, all seventhoussanders and all unclimbable. Beyond Sasaini, Shisparé (24,600 ft.), a needle-sharp peak resembling the Matterhorn, towered into the heavens and in the Pasu Valley there was also a gently ascending snow giant of over 23,000 ft.—both waiting to be climbed!

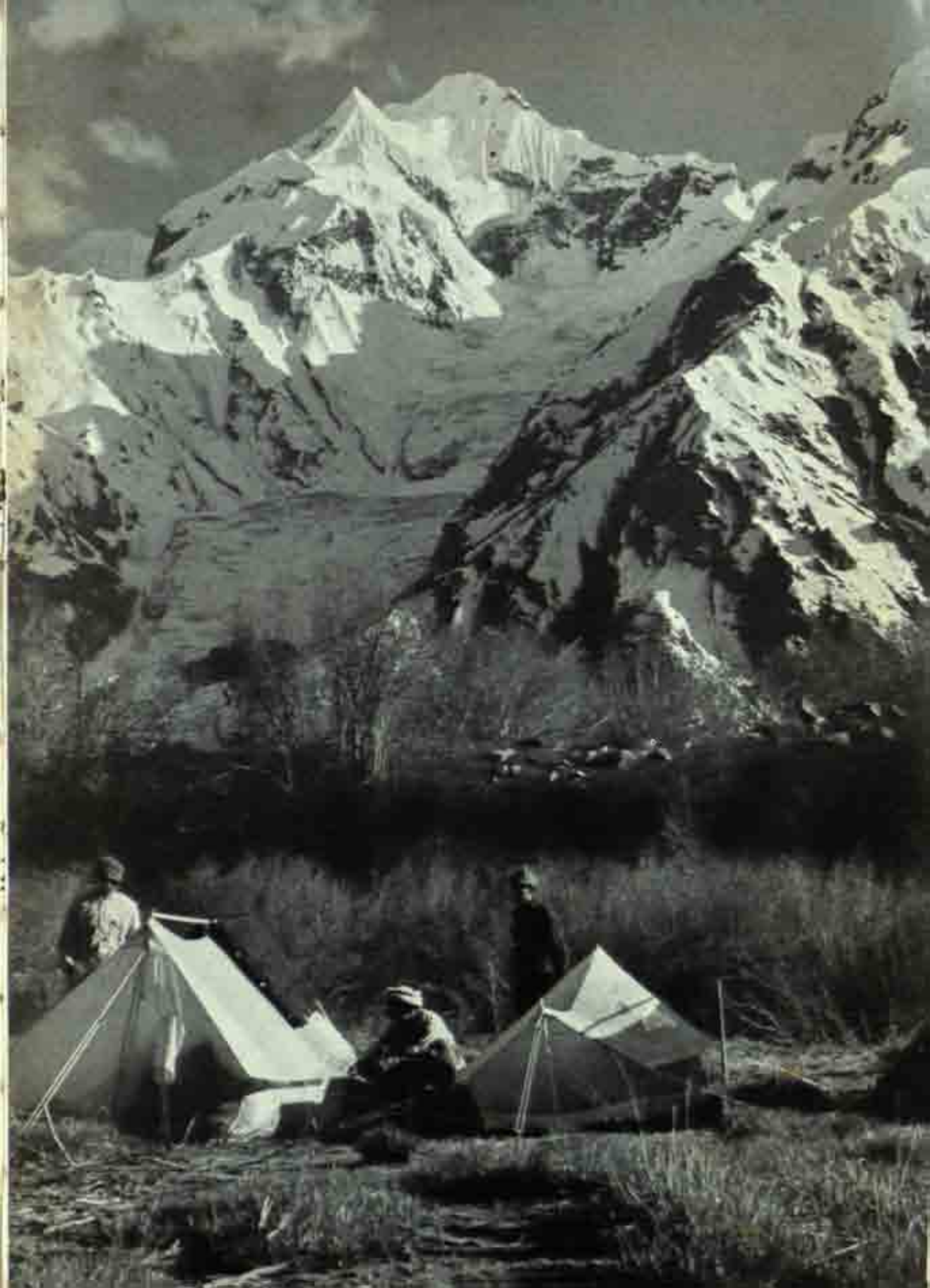
In Pasu we exchanged our mules for yaks and later we saw the Batura Glacier for the first time. A moraine-covered ice-stream came down from the mountains right past the village; it was bordered on the south by ice-clad peaks. We now set foot with our yaks on the open glacier, beyond some small lakes that were hidden by the moraine walls, and on the other side came upon a little alp lying between erratic boulders. This alp had everything, flowery meadows, fields of ripe barley (at 11,000 ft.) and grazing herds of yaks, sheep and goats. That evening we put up our tents beneath the shelter of thick flowering alpine roses.

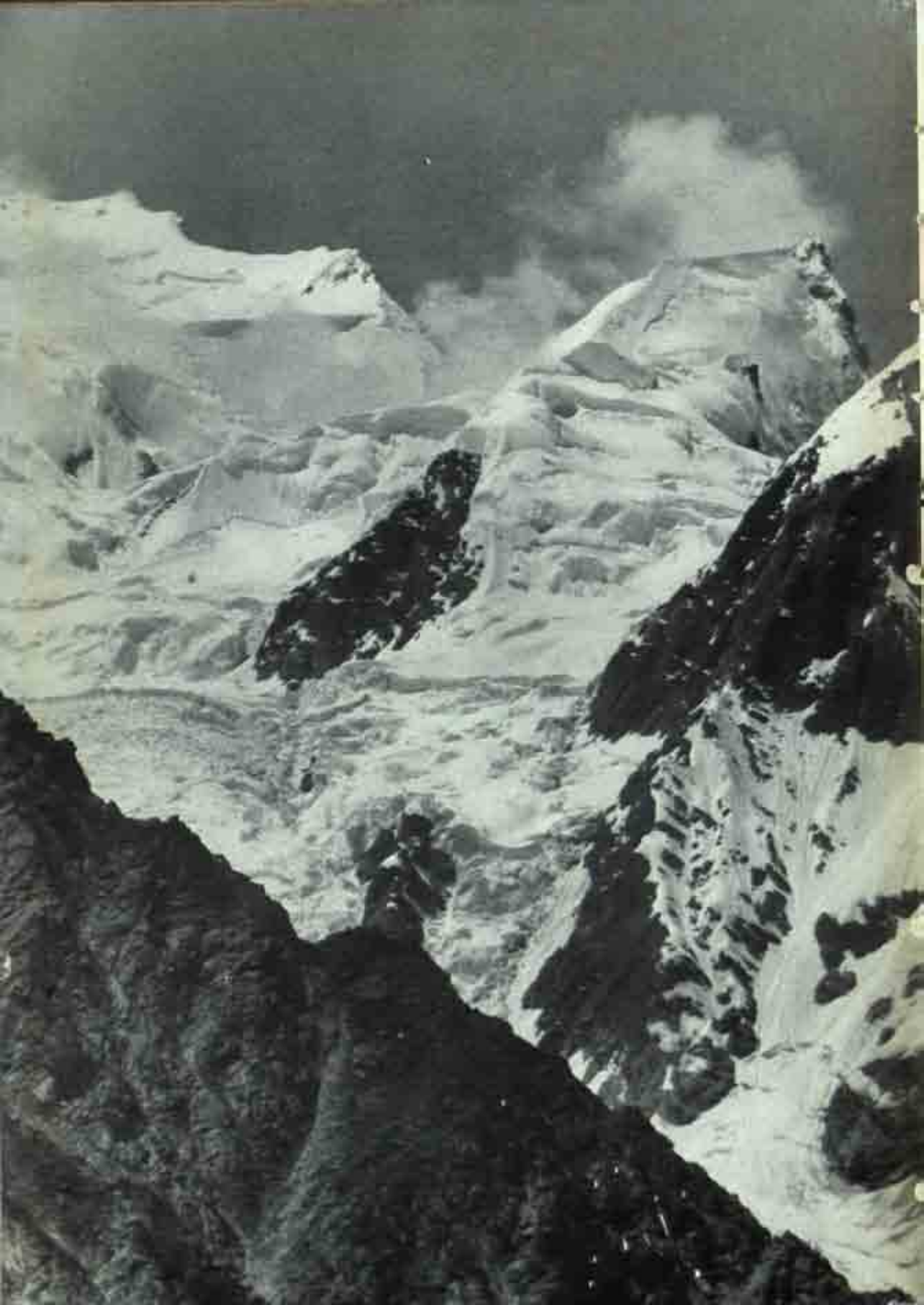
On the third day after leaving Pasu, July 21st, we erected our Base Camp on the grazing alp of Put Mahal, below the huge rock face of the nameless seventhoussanders. The scientists' report was correct; there was a gap between the unclimbable walls and through this flowed a moderately steep branch of the glacier leading to a series of snow troughs, whence there was a possible way up to the upper névé slopes of the highest summits (25,535 and 25,110 ft.). Dr. Pillewizer

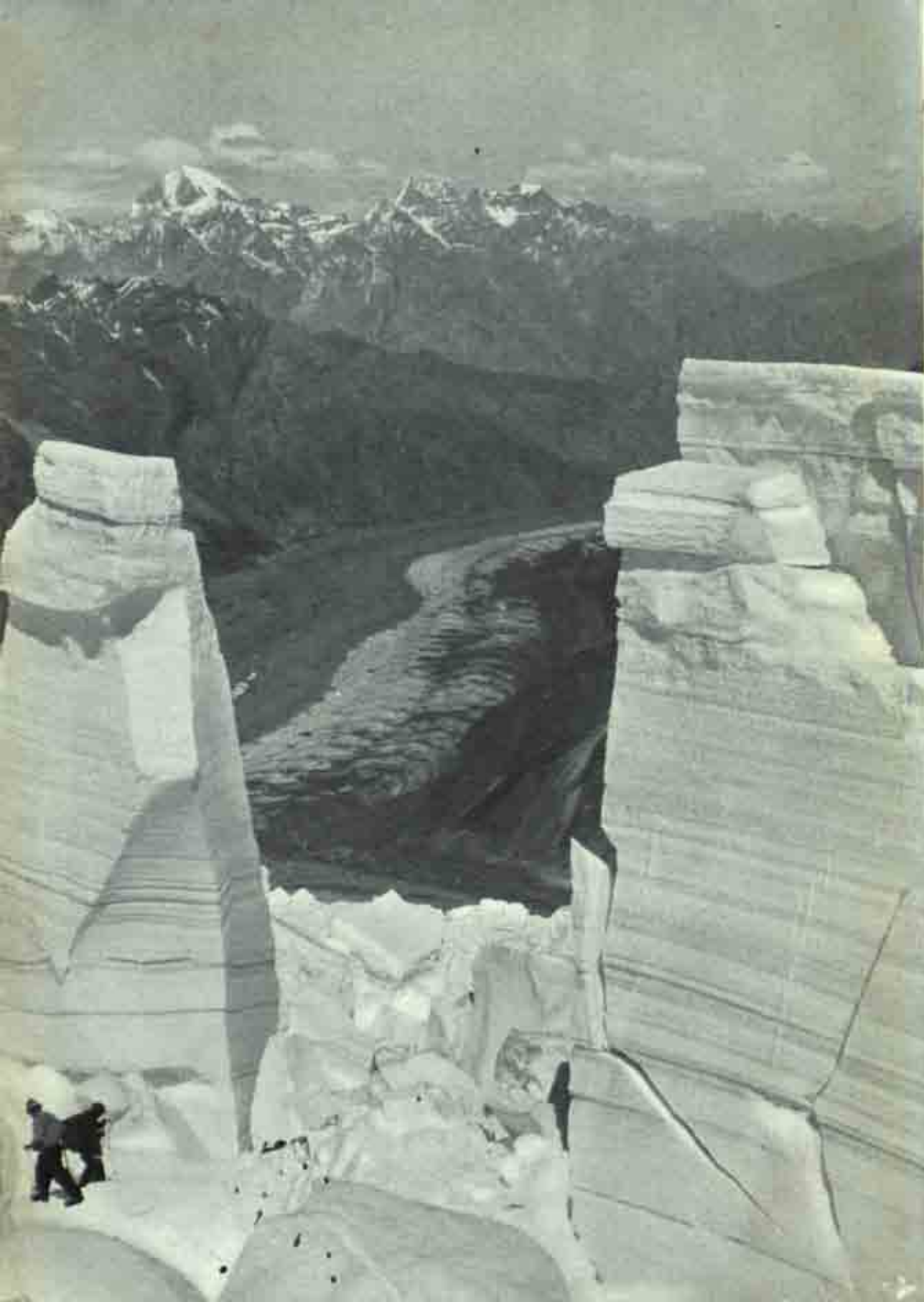
Plate 1: View of the "Wildepitze" (23,000 ft.) in the Baltar Valley, from "Bear Camp" (11,810 ft.). Three attempts were made on the north ridge descending to the right, the greatest height attained being just below the rocks under the summit where the party was forced to retreat owing to a blizzard.

Plate 2: The ice-peak to the right of the picture is one of the Batura summits (c. 23,950 ft.), climbed by Mayer and Schliessler. Some of the other 23,000 ft. peaks of the "Batura Wall" are seen to the left of the picture.











was also of the opinion that the lower part was also climbable, although he had only seen it from afar. That was three weeks earlier, but in the meantime the summer sun had softened the surface of the snow, producing new cracks and crevasses. We were faced with an ice-fall about 6560 ft. high, strewn with huge blocks of ice and criss-crossed with wide crevasses. One of the climbers now went down with a high temperature and another one had to be told off to look after him. This time Dr. Bennett sprang into the breach and energetically assisted the leading party. Our two Pakistani friends were roped in as fully-fledged climbers and came well up to scratch. Everybody joined in the attack and camp after camp was pushed forward up the ice-fall. First of all we had to deal with steep rocks, followed by a series of wide crevasses, one of which had to be crossed by means of a rope-bridge. Frequently we had to creep like flies through a labyrinth of séracs and ice-blocks while avalanches came down close to the carefully prepared track, one almost burying a column of porters. Crevasses opened between and even under the tents, and these had to be moved.

It was obvious that the glacier was in rapid motion, but we had opened the gate to the summit. After surmounting a final and particularly steep section we emerged on top of the ice-fall and the way to the seventhousanders lay open before us. Bennett and Meyer set up Camp V at 22,000 ft. and stocked it with stores for a future Camp VI. Meyer was in especially good form and went on alone to over 23,000 ft. We were now face to face with our "defenceless" seventhousanders, but next day the weather broke. I had intended to go down to Camp V, but received a message that the high ice barrier below Camp III had collapsed as if in an earthquake, so that it might not be possible to send up reinforcements. The harmless flat surface of the glacier in front of Camp III was now pock-marked with craters and crevasses and the tents themselves were in danger. I felt, however, that I must see for myself and set off down through the devastated area. There was no doubt that the build-up would have to be suspended; it was too dangerous.

While all this was going on the storm had been battering the tents of Camp V for two days. Eventually it was completely snowed-up and had to be evacuated. We all assembled in Camp IV at 20,350 ft., where food was becoming short. If the weather did not clear up soon it would be too late to achieve anything. In

Plate 3: In the great ice-fall on the way up to the 23,000 ft. peaks of the "Batura Wall". These séracs, which are liable to collapse at any time after a certain age, constitute a terrain as fantastic as it is dangerous.

Plate 4: The Hunza Gorge at Sarat at the spot where Karl Heckler met his death. This audaciously constructed track ("rafika") is made of layers of stone without mortar; they cling to the rock wall like honeycombs. Occasionally the heavy stone packing is only supported by a minute notch in the rock strata, nevertheless this historic caravan road has carried camels and mules for centuries to Chinese-Turkestan.

order to have something "in the bag", Meyer and Schliessler made an attempt on the nearest peak to our camp. Dolf Meyer reported on it as follows:

"Martl Schliessler and I crawled out of our tent at 3 a. m. on August 5th in doubtful weather. Wearing short ski we stumbled along through breakable crust towards a saddle, lit only by the beam of a pocket torch. At the end of 2½ hours we reached the south arête of our mountain in light snow-showers. The weather was getting worse, but after a short consultation we continued on crampons towards the sharp ridge, the first 300 ft. above the bergschrund being very steep. Whirling snow enveloped us and banks of cloud were coming up from the west in the early morning light. The sharp corniced ridge rose up steeply before us into the mist, to our left was a high granite face and to our right an ice-clad flank. We often sank up to our waists in the soft snow; from the views which we occasionally had through holes in the clouds we guessed that we were pretty high. A last steep icy rise in the arête and after a few hundred feet we shook hands on the summit. According to the aneroid we were at a height of 7410 m. (24,305 ft.) but after subsequent adjustments we now conclude that the proper height was about 7300 m. (23,945 ft.). We bound the flags of Pakistan, Germany and Austria to an ice-axe and Martl took photographs as far as the weather allowed. The descent was very dangerous as the new snow kept breaking away in wind slab avalanches. By 2.30 p. m. we had descended the 3600 ft. between the summit and our camp, where we were met with hot drinks and congratulations."

Almost at the same moment as Schliessler and Meyer came down from their successful ascent, Dr. Bennett came up with the bad news that Karl Heckler had suffered a fatal accident. This was a heavy blow; he had been my best assistant and friend.

It snowed the whole night through and the snow piled up around the tents in an alarming manner. The party destined for the attempt on the highest summit—Bennett, Shah Khan, Meyer and I—waited in vain; it went on snowing without pause and it was quite obvious that the attack was off. The snow was piling up on the slopes, and our retreat down the face to Camp III was perhaps already cut. I delayed departure until the very last minute, but eventually I was forced to give the order for withdrawal, so close to a really great success. We had arrived two weeks too late—the intervention of fate.

We fought our way down the steep slopes menaced by avalanches and almost buried in the fresh snow, and reached Camp III just before nightfall. Next day we all roped-down over the vertical wall of the collapsed section, expecting further falls at every moment. The porters were carrying such heavy sacks that they frequently were pulled over head first, but neither Hunza nor Nagar showed any fear. The final retreat through the ice-labyrinth was successfully accomplished owing to the fine co-operation of climbers and porters who were near to breaking

down under their heavy loads. Everybody reached Base Camp safe and sound. We had climbed one high peak and the scientists had done all they had set out to do. Schumacher had made a film of the expedition and had also filmed the life of the Hunzas. I would have been perfectly satisfied with the results of the expedition if it were not for the cross erected in the Hunza Gorge:

Karl Heckler, † 26. 7. 1954

Some more trips were undertaken in order to fill in a few gaps. Zeitter and Klamert penetrated into the furthestmost recesses of the western branch of the Batura Glacier. They considered that it would be possible to cross over into the Kukuar Valley. Bad weather held up the expedition to the Pasu Glacier. Meyer went up the Gulmit Glacier and together with Schliessler explored the névé basin of the Mutschual Glacier. The seventhousanders rising out of these valleys looked quite impossible, the same applying to those around the Shispar Glacier. Dr. Bernett, who was also in charge of ethnological and nutrition problems, went alone from Chalt into the romantic Daintar and Naltar Valleys which abounded in game, in his dual capacity of hunter and doctor.

We dismissed our last high altitude porters in Gilgit. They were perservering, tough and brave, even at great heights, and had served us well. As rock climbers they were unsurpassable. We were truly sorry to say farewell to our two Pakistani companions, Captain Shah Khan and Daud Beg; we had become real friends.

2. THE SCIENTISTS' REPORT. *By Wolfgang Pillewizer*

The main chain of the Western Karakoram, one of the most important mountain massifs in the world, rarely drops below 23,000 ft. over the whole of its 25-mile length. It dominates the valleys of Hunza and Nagar and the Batura Glacier, nearly 40 miles long, like a huge wall with peaks rising to over 25,500 ft. In 1925 Ph.C. Visser made the first reconnaissance of this glacier and of the unapproachable Batura face, continually menaced by avalanches. Until then the south side of the main chain which faces the terraced land of the Hunzas was very little known; in fact, only the valley of Bar had been visited by Europeans, the last being Tilman, Secord, Gyr and Kappeler 1947, and the cartography of the southern valleys and glaciers bore little resemblance to nature.

The most important task of the scientific party was therefore map making. Karl Heckler and W. Pillewizer intended to produce a general map of the area to a scale of 1:100,000 with the help of the system of terrestrial photogrammetry so often successfully employed on mountain expeditions. As far as possible the new

triangulation was to tie up with the trigonometrical points of the Survey of India which had been set up before the first World War in the Hunza Valley at a height of between 4000 and 5000 m. Trigonometrical survey in these high mountain areas necessitated the almost daily ascent of lofty peaks and ridges and the photographs had to be taken at a height sufficient to permit a view down into the deeply cut glacial valleys. Photogrammetric cartography provides a complete series of pictures of the country, which can be viewed stereoscopically and are therefore of incalculable value in producing a map and also for the scientific exploration of the territory. By perusing them the glaciologist is able to determine the condition of glaciers, the geologist can observe the structure and strata of rocks on mountain sides free from vegetation, and the geographical botanist the position of the sparse vegetation and forests of a region. Glaciology, geology and geographic botany were undertaken respectively by W. Pillewizer, H. J. Schneider and K. H. Paffen. A German geo-physicist, K. Wienert, resident in Pakistan, joined the expedition for a few weeks and carried out terrestrial-magnetic measurements in collaboration with Schneider and also made some high altitude experiments in atmospheric electricity. The Survey of Pakistan lent the services of the surveyor Sahib Shan to the scientific party; he was particularly useful to us owing to his knowledge of the country and language.

The field work started in the southern part of the main chain, as only in that region was it possible to link up with the Survey of India. By the end of May, K. Heckler had already done a survey from a trigonometrical point of 4800 m. (15,755 ft.) in the Rakaposhi Range. On May 29th the party assembled in Chalt and at the beginning of June went north into the Bar Valley, where the summer colony of Toltar was to serve as a base for the exploration of the Kukuvar and Baltar Valleys. After crossing the disintegrating snout of the Kukuvar Glacier the Base Camp was set up on a sandy space in the scree, covered valley only recently denuded of ice. At this height, 9500 ft., it was impossible to visualise the beauty which lay higher up. Heckler and Wienert erected their camp above Toltar in a great cirque near the snow-line. Heckler set up his plane table on ridges of over 5000 m. (16,400 ft.), often after laborious ascents, and Wienert lived alone for six days in a small tent at the same height to carry out his experiments in atmospheric electricity. Paffen and Schneider came up a few days later and Heckler carried out his survey work on the Kukuvar Glacier. While all this was going on, Pillewizer was exploring and map-making in the Baltar Valley. At the junction of two branches of the glacier, just above the laborious boulder-covered snout of the Baltar Glacier lay a stretch of meadow land dotted with birch-trees behind a high moraine wall. These trees arrayed in their green spring garb stood out before the grandiose ice-walls of the 7000-m. (23,000 ft.) peaks, which were streaming with avalanches. For the first time the extreme steepness of the mountain

flanks was a definite hindrance to successful cartography, as it was virtually impossible to take a photogrammetric picture of the branching out of the east Baltar Glacier owing to the lack of a suitable standpoint on the excessively steep mountain slopes, menaced by avalanches.

As soon as Schneider and Paffen had finished the geological and botanical survey of the Baltar Valley, the party went back to Chalt, leaving the climbers who had already set up their Base Camp there in possession. Both the Chalt Basin and the Bar Valley form part of the Nagar State. We first learnt this from the Mir of Nagar, for until then we had been under the erroneous impression that the Hunza River formed the boundary between Hunza and Nagar. Near Chalt, however, it runs north up to the main chain in the Baltar and Kukuvar Valleys. We were able to assure the Mir of Nagar that our new map would show the boundaries of his state as they were in reality.

During the second half of June, Heckler went upstream on the Nagar side of Chalt, and Pillewizer on the Hunza side, in order to examine the opposing mountain slopes. Heckler succeeded in joining his survey to three points of the Survey of India and Pillewizer was able to map the north face of Rakaposhi from 14,905 ft. above Hindi. This mountain flank rises 19,000 ft. above the well watered meadows of Minapin to the summit of Rakaposhi, though the horizontal distance is only 7 miles. The weather broke on June 21st and in consequence all survey work was badly held up until the end of the month. Paffen, Pillewizer and Schneider spent their time during this period on the Shispar Glacier in the upper Hasanabad Valley, the scree-covered snout of which up to 1925 extended 3 miles further down the valley. The Shispar Glacier, the flow of which, as well as that of the Baltar Glacier, was measured photogrammetrically in several sections, is in retreat at the moment, while the adjacent Mutschual Glacier is advancing. During July, the snout advanced 36 ft., a remarkable achievement, as all the neighbouring glaciers are either retreating or at least stationary. The end of the Shispar Valley is blocked by a magnificent cirque, 10,000 to 13,000 ft. high, consisting of rock and ice precipices, with steep hanging glaciers and constantly menaced by avalanches which crash down on to the flat boulder-covered Shispar Glacier.

It may be of interest to note in passing that the glaciation of these Karakoram Valleys during the Ice Age was comparatively small. The ice-level was then only 350 to 650 ft. higher up the terraces which are utilised as grazing and arable land. The glacier tongues stretched right down into the Hunza Valley, where they or their moraines dammed up the river in various places, but the main valley itself did not have an independant glacier of its own.

During the period of bad weather, Heckler attempted to survey the slopes of the main chain running towards the Hunza Gorge from a spot on the 14,595-ft.

ridge of Buri Harar above Nagar. This task, which took three days, necessitating a walk of nearly 50 miles, all on foot, with an ascent of nearly 10,000 ft., had to be repeated by Heckler, this time from Gulmit, as soon as the weather improved. In the meantime he was the guest of the Mir of Hunza in Baltit and was able to take part in the harvest festival of the Hunzas. The Expedition is deeply indebted to the Mir, as he supplied sufficient ata (wheaten flour) from his storehouses for all the porters of the scientists' party, although at that time in June there was a great shortage of this commodity in the territory. The porters insisted on this ata, which is their chief food and is used for making chapatis (flat wheaten cakes) although the Expedition had brought along enough tinned food from home.

As the weather gradually improved towards the end of June, Heckler rode up the Hunza Gorge to Gulmit along narrow exposed tracks. He described in his diary the very spot where he was to meet his death a month later: "Near Saret the valley becomes a gorge. At the place where it turns off to the north, the river forces the path high up on to the rocks. It is very exposed and is often vertically above the raging river. Loose stones are laid on the smooth rock and it is a perpetual wonder that they manage to stay there!"

Heckler had to cross the Hunza River at Gulmit in order to reach Buri Harar by a suspension bridge, of its kind quite unique in this country. The gorge, 375 ft. wide, was spanned by five wire ropes anchored on either side by stones and 100 ft. above the raging torrent at the lowest point of the span. Two of the ropes served as hand rails and small blocks of wood were fixed into the remaining three ropes at irregular intervals and acted as footholds. As these wood blocks were about 4 ft. apart and the bridge swayed considerably, progress was by no means easy. Heckler crossed it four times in order to take photographs of the great glacier from the other side of the valley. This glacier stretched eastwards almost to the Hunza River. The Ghulkin Glacier rises in the steep avalanche-swept slopes of a shapely peak of 24,600 ft., and right at the end of its boulder-covered snout, irrigation channels carry away the melt water, a sign that the glacier has been stationary for some time. Pillewizer estimated its speed at about 40 cm. (c. 1 ft. 4 in.) per day, measured about 1 km. (1100 yds.) above the foot, which is just about enough to counteract the effect of ablation.

On the other hand, the Pasu Glacier, the second largest ice-stream in our area, has been in retreat for some considerable time, due no doubt to the fact that it is almost entirely free from detritus. Thus the surface is more exposed to the effect of ablation than if it were protected by a covering of stones or dirt. A flow measuring point was also set up which will probably provide an interesting comparison with results already achieved on the neighbouring Batura Glacier. This glacier, which is the longest in the district, extending for about 36 miles down the valley on the north side of the main chain, is approximately $1\frac{1}{2}$ miles

wide and several hundred metres thick. It reaches the Hunza River a few miles above Pasu without however crossing it. The caravan road to Kashgar is forced to make a detour in order to avoid its scree-covered snout.

The scientists were all together in Pasu early in July. It was their intention to erect a Base Camp as high up the Batura Glacier as possible and for this purpose yaks were employed. These tough and sturdy animals carry about 130 lb. over trackless country and they proved extremely useful on both the scree slopes and the bare ice of the Batura Glacier, carrying all our equipment from the end of the glacier to our Base Camp at Lupdur (12,800 ft.), 22 miles distant, in $3\frac{1}{2}$ days. The ascent was considerably simplified by the so-called ablation valleys which run for about 12 miles along the north bank of the glacier between the mountain side and the moraine. They contain streams and sometimes lakes with occasional room for grazing alps and dwellings; in fact at Yashpirt, the largest of these little colonies, barley is grown. On the slopes of the limestone chain of Lupghar, which borders the Batura Glacier to the north, Schneider found fossils of the permian-carboniferous system. The "Batura Wall", a huge face of crystalline rock plastered with ice attaining a height of 25,585 ft., towers up on the opposite side of the glacier. Ph. C. Visser¹ has the following to say about it: "It presented a picture of terrifying and menacing grandeur surpassing anything I have ever seen in the mountains. Nowhere else have I ever seen such uninterrupted and devastating avalanches as in this part of the Karakoram."

It will therefore be quite understood that after reading this description our party entertained but slight hope of climbing any high summits on the main chain above the Batura Glacier. But Heckler and Pillewizer, who were the first to enter the Batura Valley, detected a weak spot in the wall which might provide access to the peaks. About 12 miles above the snout of the glacier a lateral ice-stream, coming down from the right, joined the main stream. Its white ice united with that of the boulder-covered Batura Glacier where the eye could follow it for about 10 miles as a bare ice strip over 700 yards wide, with characteristic pressure waves. It looked as though it would be possible to gain access via a 6500-ft. ice-fall to high névé terraces, out of which rose the high peaks with snow slopes and ridges with fairly easy gradients. On July 11th a message to this effect was sent back to the climbing party, and they at once began the ascent of this lateral glacier. Unfortunately we did not realise that it was a very swiftly moving glacier, the surface of which underwent almost daily change. A photogrammetric movement measurement taken just below the junction of the two glaciers showed that the lateral glacier was advancing about 60 cm. (1 ft. 9 in.) per day while further up the ice-fall an advance of up to several yards per day could be expected. Pillewizer took ten movement measurements on the Batura Glacier over a distance of about

¹ Ph. C. Visser: *Scientific Data of the Dutch Expedition to the Karakoram*. Vol. 2. Leiden 1938. P. 149 and 109.

25 miles, each one being repeated three times. Ablation measurements were also determined. All this glaciological research was intended to give an insight into the ice system of the Batura Glacier, from which conclusions could be drawn as to the climatic conditions of the Karakoram massif.

All this time Paffen was carrying out regular meteorological observations, which could be compared with those of the meteorological station in Gilgit. The extraordinary dryness of the atmosphere was a noticeable feature, estimated from the relative humidity. It was frequently below 10%, which explains the desertlike appearance of the mountains.

The cartography of the Batura Glacier was undertaken jointly by Heckler and Pillewizer. Bad weather hindered work on the west branch of the glacier. No interruptions of this sort were experienced on the lateral glacier to the north near Lupdur, but it was extremely difficult to estimate angles at the end of the valley owing to the excessive steepness of the slopes, although a survey point was established 5300 m. (17,385 ft.) up on the ridge.

As soon as the cartographical, geological and botanical survey of the Batura Valley had been largely concluded, the scientific party descended the glacier with their yaks on July 20th. The yaks carried Schneider's collection of rocks and Paffen's botanical specimens as well as boxes containing hundreds of exposed topographic survey films. Paffen and Schneider went on ahead, as they wished to include the limestone mountains north of the glacier in their survey, which they also extended as far as Khaibar in the Hunza Valley. Of special importance were Schneider's magnetic measurements, over 200 in all, which constituted a cross-section of the whole Karakoram Range.

Heckler made the last entry in his diary in Pasu on July 24th and remarked at the end: "As far as I am concerned the most important job in the Karakoram is finished and now for Nanga Parbat." But that was not to be. On July 26th, while descending the Hunza Gorge, he slipped off the narrow track near Saret and fell over 50 ft. down a vertical rock wall into the raging river below. He was drowned before the eyes of his comrades, who were powerless to save him. The fact that the cartographic survey of the expedition was a complete success is solely due to the indefatigable and admirable efforts of Karl Heckler. During the course of two months he climbed a total height of 40,000 m. (164,000 ft.) up difficult faces, ridges and glaciers, and only the strongest porters were able to follow him. His body was not recovered until three months later, in the Hunza River. It is to be buried in the Christian burial ground at Gilgit. Karl Heckler was one of the best German experts on high mountain surveying. He left a wife and three children and the expedition lost a true and irreplaceable comrade.

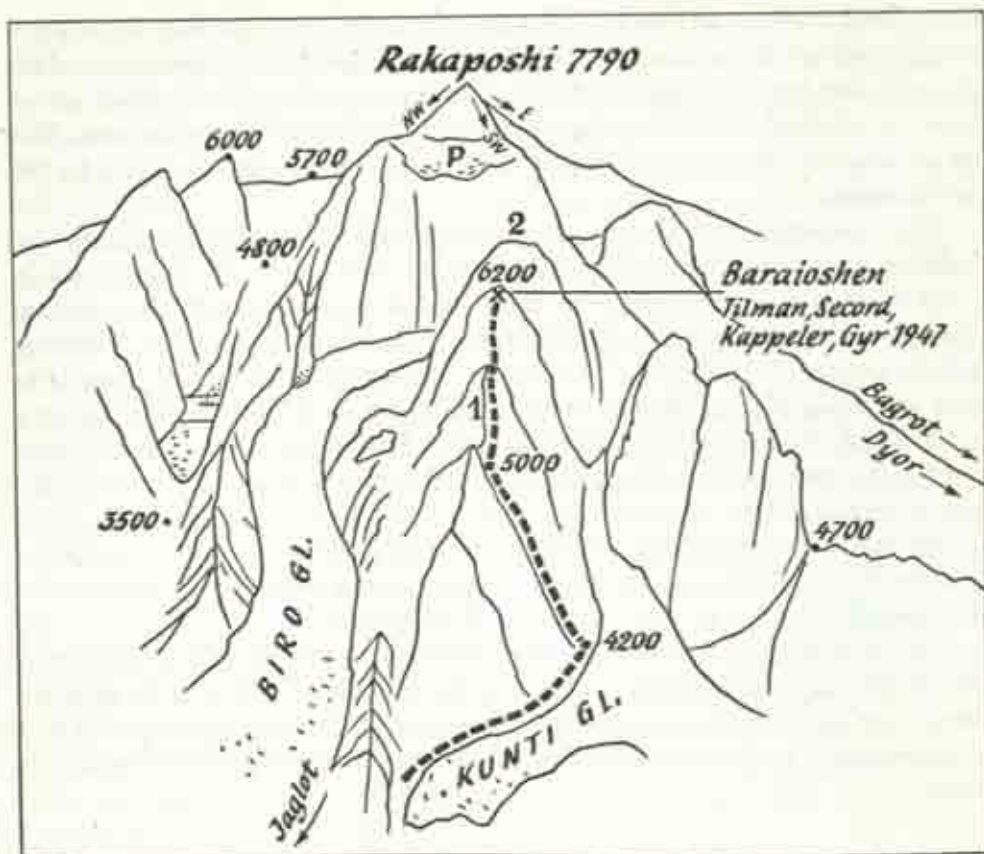
Pillewizer now took over what was left of the survey work, which consisted only of a few supplementary measurements in the Mutschual Valley and in the

Chalt Basin. Paffen extended his botanical research to the Nagar side, where pine-forests grew on the north slopes of Rakaposhi, and also to the desert area of the Hunza Valley between Chalt and Gilgit. Schneider continued his magnetic survey right up to Gilgit, where he made contact with Dr. Wienert's measurements. The entire scientific group reassembled in Gilgit on August 12th, and Schneider left for Germany.

The two remaining members of the party, Paffen and Pillewizer, visited the Rakhiot Valley near Nanga Parbat with Sahib Shah during the second half of August. It was of importance for the botanists to link up with the botanical research undertaken there by C. Troll in 1937. Pillewizer had the job of making a fresh survey of the Rakhiot Glacier and measuring its movement in order to note any changes since the first survey undertaken by R. Finsterwalder in 1934.

The old sites on the Märchenwiese (Fairy Meadow) and the Great Moraine (14,890 ft.) were used for this purpose and a new survey made. The snout of the glacier showed signs of retreat, but this was not so obvious higher up. Five photogrammetric movement measurements were made on the glacier and when compared with those made by Finsterwalder in 1934 should show whether the considerable advance of 7 ft. per day is still maintained.

The field work of the scientific party was now at an end. The evaluation of the results achieved will take a long time to work out, but it may however be stated that the activities of the climbing and scientific parties have resulted in a comprehensive survey of the little known north-west portion of the Karakoram Range.



Sketch map of the reconnaissance routes of 1947 and 1954 to the south-west ridge of Rakaposhi, based on a drawing made by Hans Gyr in 1947. The dotted line shows the route of 1947 over the south-west spur (1) as far as Baraioshen (20,340 ft.). This route was followed several times by the Tissot's Expedition in 1954 and continued up to the "Monk's Head" (2), about 21,325 ft., whence a practicable route to the south-west ridge could be determined. All heights marked on the sketch were reached and surveyed by former reconnaissance parties in 1938 and 1947.

RECONNAISSANCE OF RAKAPOSHI 1954

By Alfred Tissières

Our expedition was made up of five climbers from the Cambridge University Mountaineering Club: G. C. Band (who was a member of the 1953 Everest team); R. R. E. Chorley; D. Fisher; G. J. Fraser; E. R. Wrangham, with myself as expedition leader. We all gathered at Rawalpindi on June 15th, where Major-General Haya Uddin joined us as liaison officer.

We had permission to go to the region of the Hispar and the Batura. When we got there we learned that Rebitsch's party had abandoned Rakaposhi and that we were therefore free to go there.

After about ten days of acclimatisation in the Dainto region, north of Chalt, and a short visit to Hunza and Nagar, we set up our Base Camp at the foot of the Biro Glacier, between the north-west and south-west ridges of Rakaposhi, on July 16th. Before attacking the south-west ridge, which from a distance (and according to members of the 1947 expedition) seemed difficult and particularly dangerous, we decided to go and examine on the spot the possibilities offered by the north-west ridge. On July 19th, Band and I climbed the peak that marks the beginning of the north-west ridge at about 19,500 ft. (the same summit as Secord and Vyvyan had climbed in 1938). The descent from this point to the north-west ridge, properly so-called, seemed much too difficult and dangerous, so we gave it up and turned our attention to the south-west ridge.

On the 22nd we placed the Base Camp at the foot of the south-west spur. On the 23rd one comrade and I reached the south-west spur through a couloir (described by Tilman) and we decided to push on towards the south-west ridge. On the 28th we pitched camp on the spur at 17,100 ft. with the whole party, including six Hunzas of the Northern Scouts, and provisions for a month. From this point we had to follow a fairly difficult ridge, icy in places and dangerous for inexperienced men, so we decided to send the Hunzas back to their base, for they were scarcely of any use to us. Reckoning on three or four relays for establishing each camp, we pushed along the ridge towards the main obstacle, called by the 1947 expedition the Monk's Head. From July 29th to August 1st the weather had been fine, but from then until August 18th, the date on which we finally gave up, there were only two decent days; it snowed all day the greater part of

the time. Consequently our progress was slow and our provisions were eaten up. On August 11th we camped at the foot of the Monk's Head, and on the 12th, in good weather, while a group relayed loads along the ridge, Band, Fisher and I climbed the Monk's Head along a steep ridge of snow and ice and then by an ice slope of 40 to 45°, totalling a difference in altitude of 2000 ft. We returned the same day to camp at the foot of the Monk's Head and prepared for an attack towards the summit.

In fact, it did not seem to us that there was any serious obstacle between us and the summit. Unfortunately the weather worsened again the next day and after five days of bad weather we decided to give up. Of our provisions we had nothing left but what we had set aside for an attack on the summit and there would be no point in consuming them while standing still.

Although this route might not be easy, it presents no serious danger for experienced climbers, and I am convinced that a strong party, with light equipment, would have every chance of success, provided that the weather permits.

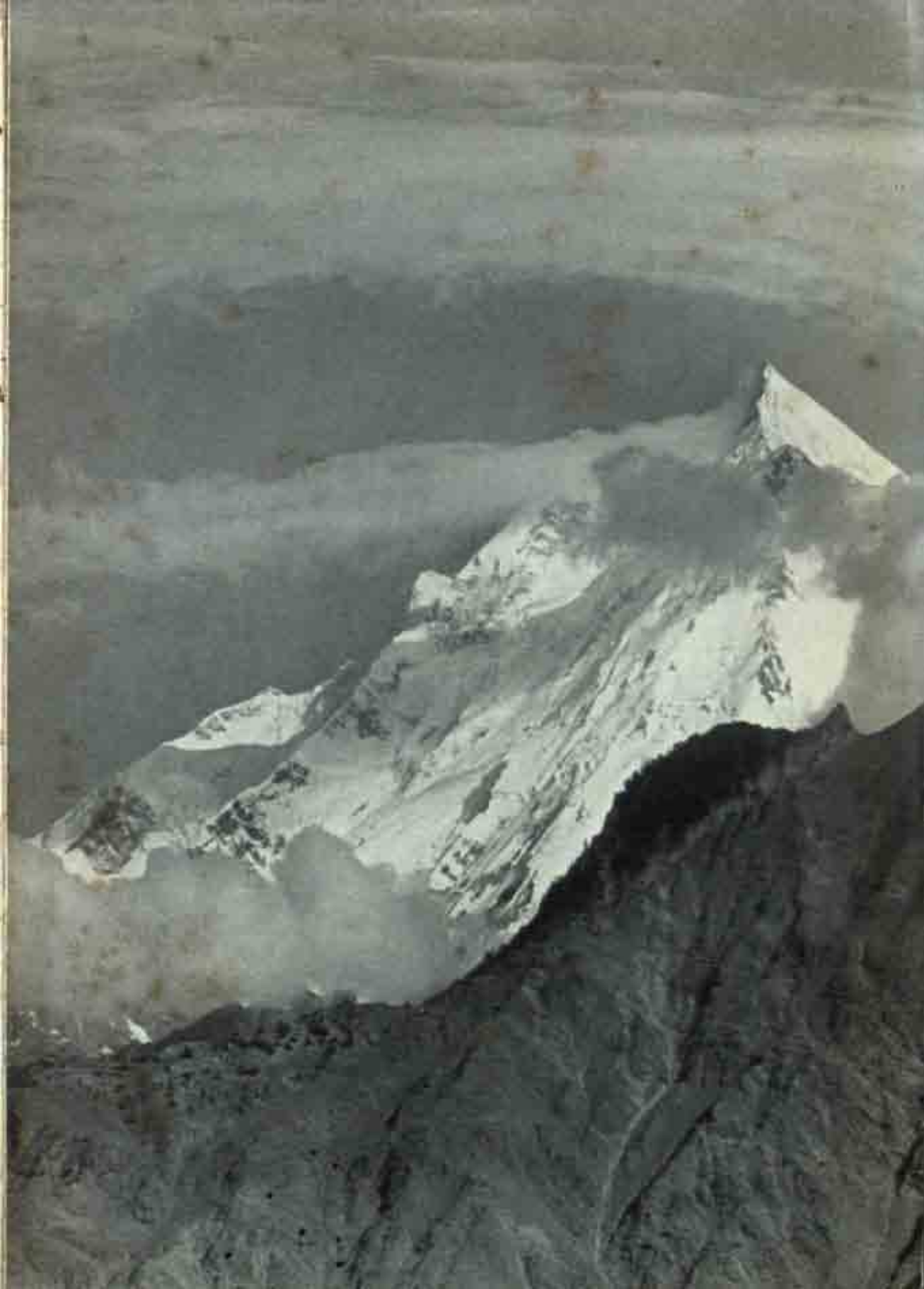
Several times we met the members of the Rebitsch expedition and at Pindi, on the return, we had the pleasure of spending the evening with the Italian expedition returning from K2.

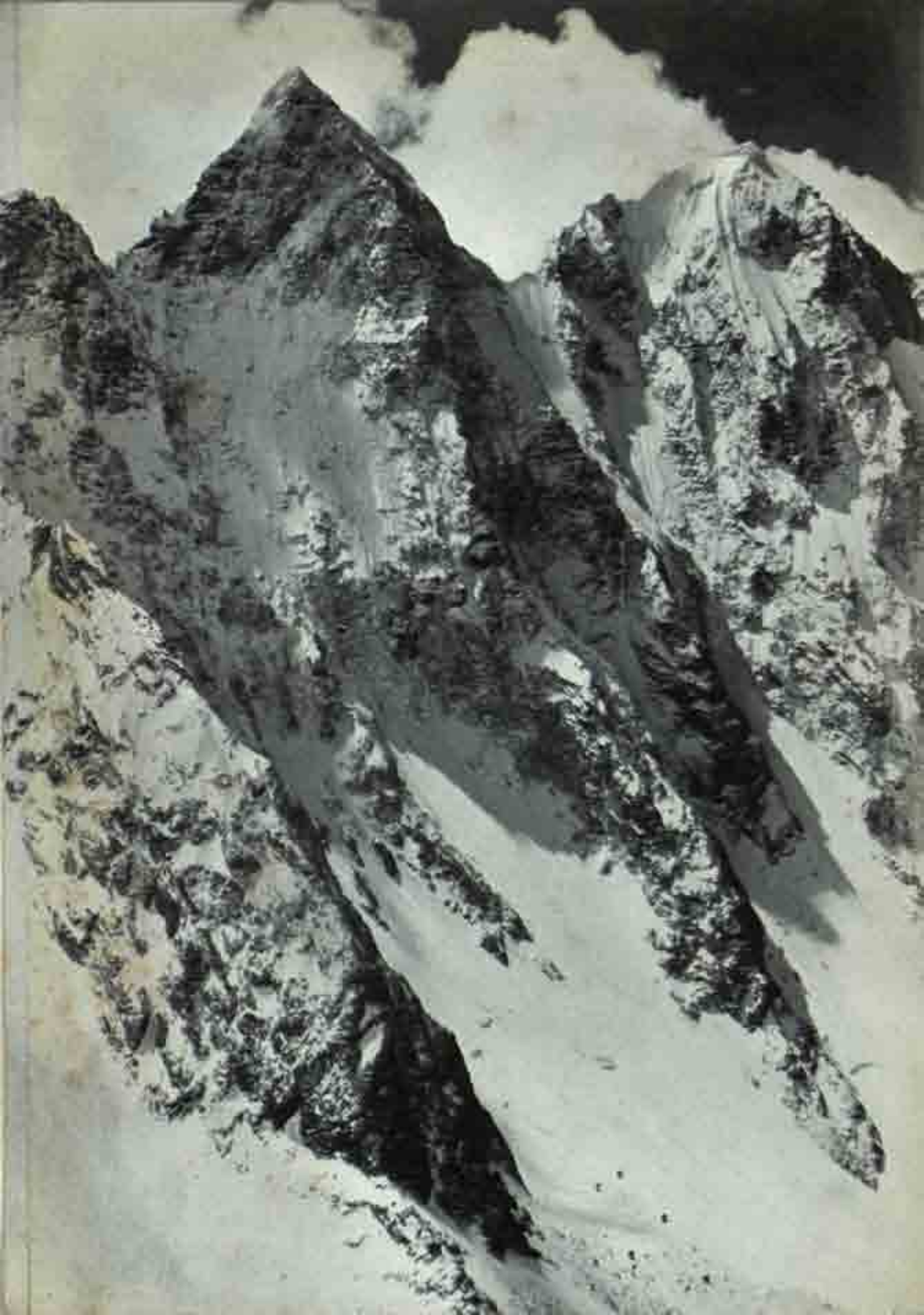
Plate 5: Rakaposhi seen from the neighbourhood of Chalt. Facing the camera and descending from the summit is the north-west ridge. The rock crest just emerging from the bank of cloud forms the northern boundary of the vast flat terrace which is vaguely seen through the clouds in front of the ice slopes of the south-west arête of the mountain.

Plate 6: The enormous granite towers on the south-west arête of Rakaposhi seen from a height of 5000 m. at the upper end of the couloir leading from the Kunti Glacier to the south-west spur.

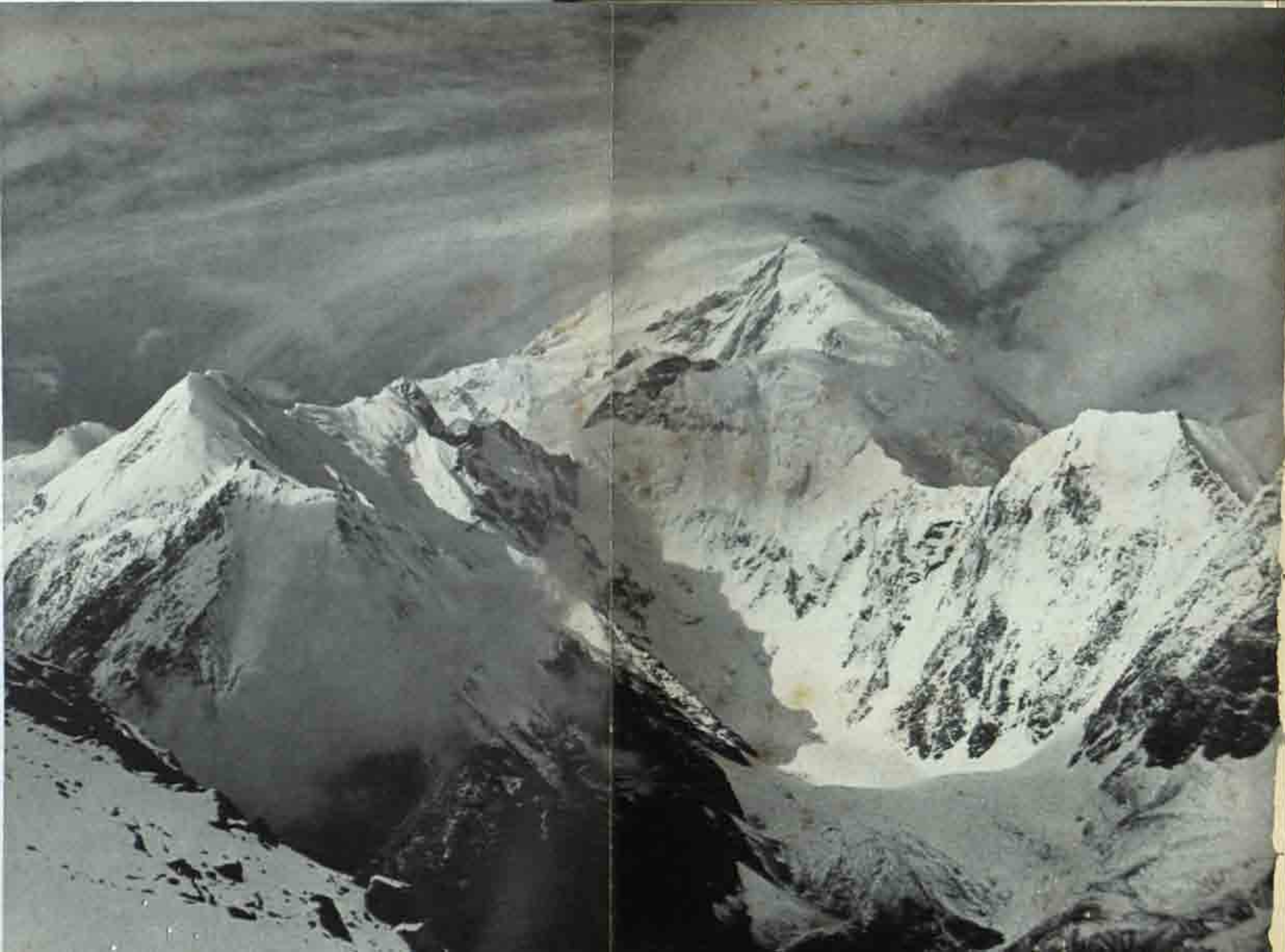
Double plate 7/8: Looking over the Kunti Glacier towards the couloir and south-west spur as far as the "Monk's Head", from a point to the west of the granite towers on the south-west arête. (Below Point 4700 m. on the Cyr sketch map on page 34.)

Double plate 9/10: View down into the basin of the Kunti Glacier. In the background can be seen the ridge connecting the south-west spur with the south-west arête via the "Monk's Head" and a level snow dome. This arête forms the southern end of the huge flat terrace of Rakaposhi. The regular-shaped summit pyramid of the mountain is vaguely visible above the mist-throated flat terrace to the left of the picture.









THE ITALIAN 1954 EXPEDITION TO THE KARAKORAM

THE CONQUEST OF K₂ *By Ardito Desio*

The Karakoram range is at a latitude analogous to that of Gibraltar, and is that portion of the Himalayas—in the widest sense of that term—furthest away from the sea. For these reasons it enjoys a climate different enough from that of the Himalayan zone best known to the public, namely that of Nepal, where the highest peak in the world, Everest, rises to 29,140 ft. The famous monsoon, the hot wind of the summer, is little felt in the Karakoram region, which it reaches pretty poor in humidity, which it has partly discharged on the mountain chains and the high plateaux nearest to the sea. Its climate is thus dryer, as one is also led to believe by the steppe paysage or real desert which prevails in this territory, except in the irrigated areas, where the vegetation flourishes with surprising abundance, giving life even at great altitudes to smiling oases rich in greenstuffs, fruits and cereals.

Politically the Karakoram is part of Kashmir, a territory in dispute between India and Pakistan, whereof it constitutes the extreme north, bordering upon Chinese and Russian Turkestan.

Actually, the armistice line on which the armed forces of the two nations are still drawn up cuts Kashmir into two parts, so that the western part of the Karakoram range has its access roads in territory occupied by Pakistan, the eastern part in territory occupied by India. The Baltoro Glacier and K₂, 28,253 ft., second highest peak in the world, rising up at its head, are situated in the western Karakoram, so that in order to get there one has to pass through Pakistan, and more precisely through Skardu. Skardu is thus the last inhabited point towards the north which one can reach by mechanical means.

From Karachi, the capital of Pakistan, situated on the Indian Ocean coast, one reaches Rawalpindi by rail or air, and continues thence through Skardu by an air service which only functions when the weather permits.

The Karakoram were apparently reached for the first time by Europeans in 1715 (Father Ippolito Desideri), but genuine and proper geographical explorations only developed during the last century and this. It would take too long to

catalogue here even a few of the pioneers, among whom one finds the names of some Italians: referring only to the territory visited by our expedition I must mention above all the expeditions of Godwin Austen, Conway, Bullock-Workman, the Duke of Abruzzi, and those of Shipton, all antecedent to the recent world war.

The idea of equipping an expedition to K2 came to me after the 1929 Italian expedition, led by the Duke of Spoleto, in which I had taken part as geographer and geologist. On that occasion I had examined at close range the environs of the lofty mountain and all the neighbouring peaks of that mountain chain, carefully studying the climbing possibilities. At the same time this expedition had left open various scientific problems which it would have been of the greatest interest to solve.

It was in 1936 that, with a few friends in support, I started busying myself with an expedition of this sort, but it was only in 1939 that I managed to make its foundations firm, with the support of the Italian Alpine Club. The war cut off my preparations. In 1949 I began to see some possibilities of realizing my dream, but grave difficulties, especially some of an economic nature, put difficulties in the way of my enterprise. In 1952, finally, the Italian National Olympic Committee placed the necessary means at my disposal for a preliminary reconnaissance in Pakistan, which made it possible for me to collect the essential data and information. But an unforeseen obstacle closed the door to my hopes: the permit for such an expedition had already been granted by the Pakistan Government to Dr. Charles Houston, the leader of an American expedition, and it seemed to them illogical to grant another for the same area in the same year. I returned to Italy, after having made a direct request for authorization to carry out in 1953 a preparatory journey, and to lead in 1954 an expedition to the Baltoro Mountains, with two programmes, one of them scientific and the other for mountaineering. The latter included the ascent of K2.

The negotiations, which went on for about a year, gave me alternations of hope and delusion. In mid-July of 1953, just as the scales seemed about to come down against me, I learned on returning from a trip to Greece that the permit for the preliminary journey had been granted.

Despite the aforesaid unfavourable outlook, my optimism had in the meantime moved me to make certain preparations and to search for the economic means, which were in fact provided by the National Research Council.

In the course of ten days I had to organize the journey and despatch the baggage by a vessel which sailed monthly from Genoa to Pakistan. I co-opted as my helper on the mountaineering side Riccardo Cassin, whose journey was paid for by the Italian Alpine Club. On the 20th August I left Italy, travelling by air to Karachi and thence to Rawalpindi, where I met the Houston expedition on its return from K2, and on to Skardu, the caravan departure-point for the Karakoram.

Before proceeding towards K₂ I went at the invitation of the Pakistan Government to the Stak Valley, a tributary on the right of the middle Indus, to face the problem of a glacier which in the course of three months the preceding spring had advanced some seven to eight miles, invading the whole valley and seriously threatening the villages below. Thence I crossed two passes about 15,000 ft. high on the main path to K₂, reaching Askole, the last inhabited village, at an altitude of about 10,500 ft., on the 18th September. I then continued along the Baltoro Glacier and its largest confluent, the Godwin Austen, reaching the slopes of K₂ at about 16,400 ft. on the 26th September. After a reconnaissance below the Abruzzi Spur, I made a rapid return to Skardu and four days later to Rawalpindi, reaching Italy again some two months after I had left it.

On my return home I learned that the Pakistan Government had granted me the expected permit: it was only from that moment that I could really get going, gathering the financial means necessary for the enterprise and its equipment.

The fundamental plan of the expedition, which I had drawn up immediately after my return, provided for the organization of two sections, one a climbing section and the other scientific, the former having as its task the ascent of K₂, and the second having that of completing and extending the studies and researches carried out by the preceding expeditions and particularly the Italian one of 1929, in the fields of geography, geology, geophysics, of paleontology and ethnography, partly in the basin of the Baltoro and partly in the second zone of southern Pakistan. This project, associating such separated tasks in a single expedition, differed from those of all the recent expeditions to the highest peaks in the world, and it awakened perplexity in climbing circles, which maintained that the scientific activity would seriously impede the development of the mountaineering enterprise. That I did not give up was because I maintained that success depended above all on accurate preparations and on an opportune distribution of the tasks of the two sections in time and space, realizing by this temporal linkage a conspicuous economy in the costs which would have been demanded by two separate expeditions and wasting a permit which it would have been exceedingly difficult to get renewed.

Speaking of K₂, I ought to record that in the last half century the mountain had already been attacked five times by climbers of various nations. The first was carried out in 1902 by the Austro-Anglo-Swiss team of Eckenstein-Pfannl-Guillarmod; the second was that of 1909, led by the Duke of Abruzzi, who opened the way for the succeeding expeditions along the south-east spur, subsequently known as the Abruzzi Spur. There ensued attempts led by Charles Houston in 1938 and 1953, and that by F. Wiessner in 1939. All three succeeded in reaching the "shoulder" of the giant, and Wiessner reached the maximum height of 27,544 ft. These attempts were tragically marred by the loss of five lives, two of them American.

The foundations of my financial plan rested especially upon two expected donations, one from the National Research Council and the other from the National Olympic Committee. The amount further needed for covering the total estimated cost was covered by the Italian Alpine Club by subscription. The Italian Alpine Club did in fact set up an appropriate committee formed of its leading members to collaborate with the climbing section of the enterprise, and when, owing to bureaucratic difficulties, the National Research Council's donation had to be temporarily suspended, the commission—through the work in particular of its vice-president Doctor Vittorio Lombardi, who had from the very beginning given us valuable support—intervened to undertake the expedition's financial organization.

It might be interesting to relate at this point how the preparations for the expedition came to be made. I must say straight away that they arose from a fundamental plan which I had drawn up; in it I envisaged all the operations in detail and the relative dates from the 25th November 1953 to the very day of K2's conquest and from then until our return to Italy.

I can only record here the general timetable of the expedition so far as concerns the climbing side of the venture, observing only that for each of the four phases here mentioned there existed highly detailed timetables, which I shall omit for reasons of brevity.

1st phase : organization. Equipment of the expedition in Italy, from the 25th November 1953 to the 31st March 1953.

2nd phase : preparatory. Transfer of components and baggage from Italy to the base-camp. Acclimatization and rest. General test of the materials *in situ*. From 1st April to the 15th June.

3rd phase : the assault. Equipment of the camps along the Abruzzi Spur on K2. Transportation of supplies to the high camps. Final assault. From the 10th July to the 20th August.

As regards the scientific part, all operations down to Skardu were provided for jointly with those already detailed. From Skardu the scientists, supplied by small light caravans, were to develop their work independently, first in the Stak area and then on the Baltoro, where a meeting was envisaged for the 20th July. The return to Italy was scheduled for the first half of October.

It is a fact that all the preparations contemplated in the basic plan came to fruition and the dates given were in general adhered to. Only the assault on the summit of K2 was seriously retarded as a result of the exceptional duration of bad weather in the assault phase. It may therefore be superfluous to occupy ourselves any more with that plan and we may pass instead to recording the salient events of the expedition.

I must add here that at first the expedition's personnel was to consist of eight climbers and seven scientists, excluding the chief, with the right to increase the climbers by two, since it might prove impossible to provide at least four Sherpas. In reality the climbers eventually numbered eleven, while the scientists remained as originally planned.

Let me now present my companions and collaborators: Prof. Paolo Graziosi, aged 47, Professor of Ethnology in the University of Florence; an ethnographer; Prof. Antonio Marussi, aged 46, Professor of Geophysics in the University of Trieste, a geophysicist; Dr. Bruno Zanette, aged 31, Professor of Petrography in the University of Padua; petrographer; Capt. Francesco Lombardi, aged 36, geodetic and topographical expert in the Italian Military Geographical Institute; a topographer; Dr. Guido Pagani, aged 37, assistant at the Civil Hospital at Piacenza.

Erich Abram, aged 32, from Bolzano, mountaineer; Ugo Angelino, aged 31, from Biella, mountaineer; Walter Bonatti, aged 24, from Monza, mountaineer; Achille Compagnoni, aged 40, from Cervinia, mountaineer; Cirillo Floreani, aged 30, from Cave del Predil, mountaineer; Engineer Pino Galotti, aged 36, from Milan, mountaineer; Lino Lacedelli, aged 29, from Cortina d'Ampezzo, mountaineer; Mario Puchoz, aged 36, from Courmayeur, mountaineer; Ubaldo Rey, aged 31, from Courmayeur, mountaineer; Cino Solda (or is it Bolda?), aged 47, from Recoaro, mountaineer; Sergio Viotto, aged 26, from Courmayeur, mountaineer; Mario Fantina, aged 33, from Bologna, cinematographer.

The choice of the scientists was made by me with reference to the special tasks destined for each. The choice of the climbers resulted from a series of selections. The names were given first of all by the C.A.I.

On the basis of a first examination, twenty-three were put on a short list as those likely to be most useful. These were convened by me to a meeting at Milan on the 15th December and given all relevant information regarding the methods and conditions for the expedition: all of them volunteers, and thus not salaried, all subject to an agreed discipline. After this meeting, when I took the opportunity to illustrate, with lantern slides among other things, the Abruzzi Spur of K2, we had the first medical examination and the physiological tests of the candidates at the Milan University clinics. A first selection was made on the basis of these tests.

As none of the candidates had taken part in climbing expeditions outside the actual Alps, and in order to test out certain materials for the expedition, I had arranged a couple of winter campaigns for the candidates on high mountains, one on the Little Matterhorn at a height of 12,500 ft., and one on the Monte Rosa group between the Gnifetti refuge and the summit (15,217 ft.).

During these exercises I had arranged for various practices on rock and on ice under the control of an official of the Army Climbing School on the basis of a daily programme drawn up by me. The first of these campaigns ran from the

19th to the 28th of January. Before setting off, the climbers were subjected to further tests and physiological examinations at the appropriate department of Turin University and the examinations were repeated on the Plateau Rosa (10,000 ft.) at the end of the exercises.

On the basis of the physiological report and that of the military observer, I proceeded to a final selection of the climbers, who increased in number from eight to eleven, as I had learned in the meantime of the practical impossibility of engaging any Sherpas.

The second campaign also, the special purpose of which was to give a first acclimatization, proceeded according to plan from the 16th to the 26th February, with an extra week thrown in for a few only of the mountaineers.

During these campaigns we carried out tests on various materials chosen for the purpose by appropriate sub-commissions over which I had presided during their studies and composed of scientific men and technicians from various branches of industry. The tents, for instance, had been especially made on the basis of the types used by the Swiss and the English on Mount Everest. The first model had been tried out during the 1953 preparatory expedition and had been perfected thereafter on the basis of further tests made on the Little Matterhorn campaign, when the temperature had remained very low. As an example of these tests I will mention that various materials had been ordered for the linings of the tents, such as cotton, wool, silk and nylon, and that in the experimental tents we had installed thermometers for making comparisons with the different external conditions. Thus we found for instance that, weight for weight, silk suited our ends better than any other material; it was therefore our final selection for the tent type we were to use. We also tried out ropes, portable radio receivers and transmitters, a portable teleferic, and clothing of different kinds of material. The final tests were carried out during the Monte Rosa campaign.

Special studies by an appropriate sub-commission were required by the open-circuit oxygen respirators, where of two types were adopted, one Italian and one foreign: victuals were selected by a commission of physiologists, manufacturers and climbers; boots were handled by a technical commission and built to improve on the English type with a lining of opossum for the approach marches, and the same on the Swiss type, with reindeer skin for the highest altitudes. As combustibles for heating the food—tested in decompression chambers at an atmosphere corresponding to an altitude of over 30,000 ft.—we adopted propane in containers adapted to serve as oven and as burner.

All these studies and experiments went on until the date arranged for the campaigns. Towards mid-March a good deal of the material was ready for embarkation in the cellars of the Geological Institute of Milan University, which was the expedition's headquarters.

The preparation of the bales was handled by the members of the expedition themselves, with aid of a few friends, and was a very laborious business, because I had arranged for the greater part of the supplies to reach their destination without being opened at Skardu or the base-camp. Thus we had things marked in black, red, green and blue according as they were destined for the climbers or the scientists, or were intended for use on the approach-march, at the base-camp, or at the various camps up the K₂ spur. Further, we had different types of packing: silk bags, boxes of laminated wood, and others of waxed carton with a special insulation round them according to destination and contents. Industry and technicians and Italian skill did wonders in this delicate preparatory phase.

On the 30th March all was ready and the expedition's baggage, weighing over 13 tons, was duly embarked at Genoa and accompanied to Karachi by two members of the expedition. In the first days of April I sent Doctor Zanettin to Pakistan by air to organize the disembarkation and transport of the baggage to Rawalpindi. I myself left Rome on the 13th April, while the main body joined me at Karachi a week later.

Thanks to the customs facilities arranged by the Pakistan Government, and to the generous collaboration of friends resident in Karachi, the heavy kit, arriving by a Lloyd-Triestino ship on the 13th April, was able to proceed forthwith to Rawalpindi. But the unfavourable conditions for the flight to Skardu enforced a delay of several days.

During this period our expedition was enlarged by the Medical Colonel Ata Ullah, observer for the Government of Pakistan, three Pakistan officials (Major Beshir, Capt. Butt and Eng. Munir) to aid us in organizing transportation to the base-camp; also a topographic assistant named Bashadjan.

Finally, on the 27th April, the weather having improved, all the baggage and a large part of the expedition was able to reach the Skardu oasis on the left bank of the Indus by air.

While, with the help of the local authorities and above all of Ata Ullah, steps were taken to organize the great caravan for transporting the 300 loads to the base-camp, an opportunity turned up for a flight round K₂ in the same aeroplane and with the same crew that had conveyed us to Skardu. With a sky perfectly serene and an atmosphere quite limpid, at 6.30 a. m. on the 30th April the aeroplane took off from the impromptu airport and gained height in large spirals over the vast sandy plain where the waters of the Shigar meet those of the Indus. I had with me two cinematograph operators and one of the climbers (Abram), who was our specialist in the oxygen respirators we had to wear during the flight, as the DC 3 was not provided with them.

Once we had reached 23,000 ft. we proceeded towards the village of Askole and the great grey wrinkle of the Baltoro Glacier, flying over the Concordia

amphitheatre, where the two main tributaries join it. After rising to the maximum height of 23,600 ft., we veered finally towards K 2, which rose like a throne on our left. The mountain conditions, especially in the upper part, seemed to me no different from those reproduced in the photographs which Houston had been kind enough to send me.

Soon afterwards we went up the Saddle of the Winds and reached the big glaciers of Casherbrum and Urdok, barring the Shaksgam Valley, where I had made a topographical survey during the 1929 expedition. This 25-year-old experience proved very useful to me, because it allowed me to find my bearings and plot our route by memory amid the highly complicated maze of valleys, crests and glaciers in this impassable country. On reaching the Shaksgam Valley, we turned off towards the Sarpo Lagg Glacier, already well known to me, and on reaching the level of the characteristic Torre Muttagh, I found it easy enough to find once more the pass of the same name to re-enter the Baltoro, and thence reach Skardu direct after a two-hour flight. This view from above of the territory we were to visit had also provided me with useful views of conditions on the Baltoro, which appeared to be snowbound only above 14,000 ft.

In the meantime steps had been taken to recruit some 500 porters in the neighbourhood of Skardu; for practical reasons I divided them into three parties, entrusting the command of them to Solda, Compagnoni and Angelino, aided by the Pakistan officials, by the caravan leader Sadiq and by ten Hunza porters appositely recruited by Ata Allah to aid us in our high level journeys.

There were also two independent patrols: one by Ata Ullah and Floreanini, going straight to Askole to obtain further supplies of flour for the natives and to organize the radio connections, and the other by Engineer Gallotti and Puchoz, to facilitate the caravan in its river crossings.

The three parties left Skardu at daily intervals between the 30th April and the 2nd May. I left with the last of them, but by forcing my pace I slowly reached the head to gain some personal experience of the caravan's general progress. At Askole Ata Ullah had meantime found the large quantities of flour needed for continuing the march into uninhabited territory. It must be borne in mind that the porters consume about two pounds of flour a day, which means that one day's normal consumption was about half a ton. What with the trip out and home, the column of porters was expected to consume over eight tons of flour, its transportation being handled by a special caravan hired at Askole and making further trips as far as Urdukas (13,000 ft.), three days march from the base camp, where there were natural shelters and also scrub for making a fire. There were days when my caravan marching on the Baltoro amounted to 700 persons. Apart from this there were three other caravans, some independent, some united, operating in the Stak region in the service of the scientists.

It is easy to imagine the complicated problems that occupied my mind during those days and the kind of preoccupations that assailed me when, arriving on the 9th May at the stores dump at Lilligo, on the left side of the Baltoro, it began to snow. The Balti people were not provided with winter equipment, nor could I have provided it for so many people. The next day the march on the glacier continued in thick snow and in a freezing temperature. It happened fortunately that Urdukas possessed good natural supplies of fuel. But since the snowfall showed no signs of ceasing, the porters refused to leave.

Each day's halt created new complications in the matter of supplies, but on the other hand it was impossible to go on with so many people in the middle of a snowstorm.

The first desertions now began, fortunately on a limited scale. At the beginning of the afternoon the next day, leaving a good proportion of the climbing party at Urdukas for their first period of acclimatization and breaking in, the caravan succeeded in getting under way again in a clear period. The snow continued to pile up as we marched on, making it very hard going. On the morning of the 13th, after two freezing nights spent at small clear spaces on the moraine, the wind dispersed the clouds and the sun came out to warm us up, at the same time creating other difficulties by the violent reflection from the snow. We had a certain number of dark glasses, but not enough for so many people; besides, a few days before, during our flight over Baltoro, this whole area had been clear of snow. On the 14th the situation was worrying in the morning because the porters seemed determined to abandon us. However, after long argument, we persuaded them to go on. Yet one party did leave us, scattering their loads along the track.

In the afternoon we came to Concordia, the magnificent mountain amphitheatre at the confluence of the two great tributaries of the R. Baltoro. K2 rose majestically against the background of the Godwin Austen Glacier: closer and above us stood another eight-thousander, the Balchan Kangri (Broad Peak) and the Gasherbrum, with two other eight-thousanders, most of them hidden from our sight by their smaller brother. The spectacle was magnificent, but the countryside wintry.

When we arrived at the stores centre, at 15,000 ft. and only five hours from the base camp, we were faced with the unexpected. All the bearers who were exhausted and burnt by the sun, made a lively protest and pushed off in groups along the return road.

There remained with me Compagnoni, Gallotti, Rey, Ata Ullah, the three Pakistan officers, eight Hunzas and a single Balti. I was disconcerted and perplexed, and quite unable to hold back that mass of exasperated men. Straightway I sent the Pakistan officers and the caravan chief to Askole with the task of

recruiting and sending up to me as many bearers as they could manage. On the 15th May, on a day of full sun and limpid atmosphere, I ascended the glacier again up to the approaches to K2 to choose a position for the base camp: the general plan of the expedition had provided for the erection of the camp on that day. On this occasion we put up a single tent: it was like an affirmation. Then the weather became bad again and it began to snow obstinately: in ten days a layer two feet deep was deposited. Finally, on the 19th May, there arrived unexpectedly a caravan of 50 bearers led by climbers who were at Urdukas, and the next day we managed to get them to push on with Compagnoni, Puchoz, Gallotti and Rey for the base camp. On their return, however, the violently bad weather not only prevented our sending the caravan back to the base camp with further loads, but left us ourselves in serious difficulties from lack of flour. Therefore, as soon as the weather cleared a bit we had to send them down the valley. It was only on the 30th May that the bad weather ceased and the following day, mobilizing all available men, I moved to the base camp myself together with Floreanini, remaining in radio contact with Concordia Camp, but not with Skardu, with which we had never made proper contact.

The temperature remained very low: the thermometer fell to 20° below zero (C.).

Next day I sent Compagnoni, Gallotti, Puchoz, and Rey to reconnoitre the Abruzzi Spur. They returned the same evening to tell me that they had found the sites of the 1st and 2nd American camps.

After the misfortunes which had heaped themselves upon us during our march on the 29th May there arrived at the base camp that fine fellow Sadiq, with a caravan of 100 or more porters, carrying practically all the loads that had been left at Concordia. While some of them went down the next day to pick up the parcels scattered all along the route, we persuaded the porters to carry loads to Camp I.

This was unexpected good fortune. Sixty-two loads meant over 1½ tons of foods and goods. Not that these were all that was wanted for the ascent, but certainly it represented the bulk of the baggage to be transferred along the spur to provision the various camps.

Great therefore was my relief when I handed over the hastily chosen loads to the porters. On the evening of the 30th May 1½ tons of our kit had accumulated under two ample tents on the two spacious sites of Camp I, at 17,700 ft. That evening all the members of the expedition joined me at Base Camp. The festive day passed in the greatest peace of mind.

In the evening we remained a long time chattering in the mess tent about future programmes, about the difficulties of the ascent, and about the possibilities of reaching the summit.

The Hunzas began transportation with our own men on the 1st June. Meanwhile the Base Camp was busy preparing two winches which were to drag the loads up a snow slide on skids. I ought here to mention that the preceding year I had observed a very long stretch of snow running down from the Camp V and VI to the Godwin Austen Glacier. Thus the idea was born in me of taking a winch with us, to pull the loads up rather than carry them all on our backs. I had also thought of using a petrol engine, but the rather unsatisfactory results of tests during the experimental camp on the Little Matterhorn led me to abandon the idea.

On the occasion of Compagnoni's first reconnaissance at Camp II, he had confirmed the possibility of using the winch, and so, on the 2nd June, I too went up to a little saddle perched above Camp I to watch the first trials of dragging the loads up on sledges. Tests began with loads of 33 lbs. and then 44 lbs. All went well: the sledge, drawn by the hand-winch, went up a 1000-foot slope in ten minutes! The next day we began regular trains, first up 1000 ft. and then 2000 ft., using in addition a home-made winch turned out at the Base Camp. After two days work some scores of loads had already gone up to a small saddle covered with snow where tents were erected to cover the loads.

Then came the bad weather with furious winds. On the very narrow saddle of snow and rock the tents were subjected to a tremendous beating, but they did not give. Fixed ropes were promptly put up alongside the slide, along a little crest of rock, clear of all danger from avalanches.

On the succeeding days the weather remained foul, with strong wind and cold and frequent snow-storms. Still, there was no break in the transport although this severely tried the climbers and the Hunzas, who were compelled to do their work in conditions of extreme difficulty. In the meanwhile Compagnoni succeeded in reaching Camp IV and with Rey and Puchoz, he carried up to it tent and gear and foodstuffs, so that Compagnoni and Rey were able to remain there, while Puchoz went back to Camp II. But the steadily worsening weather made it advisable to remove all men temporarily from Camp IV. On the 20th a violent squall was unleashed, forcing everyone to stay under canvas. The preceding day Doctor Pagani had gone up to Camp II to cure Puchoz of throat trouble. Pagani did not consider it necessary to send him down with Compagnoni and Rey to the Base Camp: sore throats were fairly common up there and generally vanished after a day or two. Pagani did not find them a serious matter. Next day, however, Puchoz showed a certain amount of dyspnoea, but he had no fever and his pulse was regular: medical aid was supplemented with antibiotics and oxygen, of which a great deal was available. During the afternoon and evening of the 20th June the patient took food without revealing the seriousness of the malady which afflicted him. The doctor was with him in the tent. A little after one o'clock on

the 21st June, while the latter was preparing to give him some medicine, the sick man—who seemed drowsy—expired after a brief agony. It was a terrible blow for everyone.

The squall grew fiercer the next day and all who were still at Camp II hastened to come down by the fixed ropes stretched along the track leading to Camp I.

In the afternoon I saw a long file of men approaching from afar over the snow-covered glacier. I was surprised, since until then someone had always stayed on the spur to get on with the work, even in bad weather. When the file of my comrades was closer I noticed their gloomy faces but could not imagine, even remotely, the cause. Angelino drew near to me. "What is it?" I asked. "Puchoz is dead", he answered with a sob.

A grave disaster had smitten the expedition, a disaster which none of us could have foreseen. It would have been easy enough to imagine a mountaineering accident, through an avalanche or a fall, but never from illness. But the hard reality had to be faced with a firm spirit. We came together in the communal tent and consulted as to what was to be done: the sad news must be conveyed to Italy at once.

We also discussed the ways and means of burying him: carrying his remains down as soon as the hurricane was over and placing the body under the K2 spur, where the Americans had erected a monument to Gilkey, killed during the previous year's expedition, burying it there in a grave scooped out of the rock.

And that is where we bore our Puchoz on the morning of the 27th and buried him with sad ceremonial.

The expedition had been gravely stricken by the loss of one of its strongest men. But what better honour could be paid his memory than the conquest of K2, for which he had died? That was what the expedition unanimously agreed.

We had to resume the ascent with even greater vigour, so that we might carve on his stone the date of the conquest achieved in his name. On the morning of the 27th operations were resumed on the Abruzzi Spur.

The patch of clear weather that had let us recover and give burial to Mario Puchoz's remains did not last long. Still, up to the end of June the weather was reasonable, allowing our men echeloned between Camps I and IV to resume transportation of the loads with the help of the winches. These covered two stretches of about 1000 ft. each. The loads were carried on our shoulders to the snowslide just above Camp I, and were thence drawn up by the hand-winch to the so-called "intermediate station" between Camps I and II. At the "Intermediate" the loads were transferred to the other sledge served by the second winch, and thus they came to the crest of a ridge which then became our Camp II.

I must at this point record that the second American camp had been situated in a safe position, but access to it was rather dangerous and subject to falls of

rocks and to avalanches. Since, furthermore, it was some distance to the side of the slide, it could not be served by the winches.

This situation soon obliged us to choose a different situation for Camp II, on the edge of the slide itself, which gave us the double advantage of getting the fullest use of the winches and at the same time having a way up which was more direct and less dangerous. Camp IV, like Camp III, was in the same position as that chosen by the Americans. Indeed, having regard to the narrowness of the space for pitching our tents on the Abruzzi Spur and also the sharp inclination of the slope, it was of great advantage to us to utilize as far as possible the sites prepared by our predecessors, following their own way up, which was still marked here and there by fixed ropes. In general we refrained from using these ropes, as they did not sufficiently guarantee our security.

Meanwhile, as the transportation operations along the slide were continuing, on the 30th June Compagnoni, a man of the strongest physique and spirit, informed me that he and Rey had together reached Camp V, situated above House's Chimney. Later on, Abram and Viotto fixed ropes up the chimney which was encrusted with ice and filled with fresh snow.

From the 1st July the weather grew worse again and violent squalls of snow burst over the Abruzzi Spur, blocking the transportation once more and forcing the crews to remain in their tents.

These long sojourns in the tiny tents did not help the men's health at all: the prolonged immobility, the inconvenient posture of the body during meals, the very difficulty of preparing hot food, the cold and the altitude, all of these in the long run ended in a lack of appetite and digestive disturbances. Other disturbances to the throat were caused by the cold and the dryness of the air. All in all, paradox thought it may seem, the periods of immobility were more wearing to the men than the relatively good periods when they could get out and dedicate themselves to the transportation of loads and the equipping of the way up, although they remained for hour after hour exposed to the freezing wind and snow, and were subjected to indescribable fatigue in working the winches and carrying loads on their shoulders. In this work they were aided by the Hunzas, who at various periods shuttled between the Base Camp and the Abruzzi Spur, so as to complete the re-equipment, sharing with ourselves the labours of conveying the loads from camp to camp.

But things did not always go smoothly; the caprices of some of the Hunzas, who every now and then threw up their jobs without reason, and their scanty sense of discipline all led to misunderstandings which it was not always easy to pacify. In this work of reducing tension Ata Ullah often came to my aid, devoting himself to the task of securing the best collaboration from these "men of the mountain". One of our best collaborators was undoubtedly Mahdi, who came

forward each time with the greatest good will to meet our demands; another was Isa Khan.

The situation at the beginning of July was as follows: Compagnoni, Abram, Rey, Gallotti and Viotto at Camp IV; Angelino, Floreanini, Lacedelli, Pagani, Solda at II. Bonatti had just come down from IV because of sore throat, later followed by Rey and Viotto. On July 3rd Bonatti arrived at the Base Camp with a hacking cough and Viotto with general weakness, caused perhaps by preceding bouts of stomach trouble. Meanwhile, despite their torment, they continued their transportation operations on the slide, with help particularly from Floreanini, Lacedelli, and Solda, in intense cold and with the continuous threat of avalanches.

On the 2nd July Compagnoni and Abram carried up the teleferic supports above the wall of House's Chimney and, under the direction of Gallotti, they succeeded in getting it to work and using it for the transportation of a number of loads. In very few minutes the loads went up over the wall; carried on the shoulders they would have demanded unbearable toil and serious risks. Otherwise the uselessness of a teleferic in this realm has also been proved by the Americans, who had adopted a similar system.

On the 3rd July the storm raged furiously; it was impossible to go out and difficult to rest in the tents which were echeloned on the Abruzzi Spur. The canvas flapped and beat so violently as to prevent all sleep, thundering in our heads like an earthquake. On occasions it seemed as if they were just about to blow away.

On the 4th July Compagnoni, Abram and Gallotti, after having carried a series of loads up the chimney with Mahdi's aid and with the help of the teleferic, went on to Camp V and pitched a tent there, returning on the evening of the same day. It was no easy job because the wind prevented their stretching the canvas and made it very difficult to anchor the tent to the ground. On the morning of the 6th the orange-yellow tent was visible from Base Camp, through binoculars.

The 6th July was full of wind with intermittent snow. At the morning radio-appointment with Camp V, Compagnoni informed me that he had been attacked by acute earache on one side and asked for help: I proposed that he should come lower down and eventually to the Base Camp, where in fact he did arrive late in the afternoon, together with Mahdi. Thus there remained at Camp V Abram and Gallotti, who proposed to go on the next day to Camp VI, while Rey and Solda went up to Camp IV, and Floreanini with Lacedelli shifted the hand winch a little above Camp III. Below Camp III there was a small wall about 30 ft. high, along which stretched two fixed ropes left by the Americans, joined together and used on several occasions by our people while climbing. It was the only point at which ropes fixed by earlier expeditions remained in use. On the return journey Floreanini tried to descend this wall for the first time, but after a few feet the

ropes came adrift from their ice-cruised anchorage and the mountaineer fell headlong down the snow slope. He continued to whirl down, leaping and bouncing at great speed, for some 800 ft. until by a miracle he came to a stop, bruised and bleeding, on a little rocky plateau a little above Camp II. But nothing was broken; he was helped to Camp II, where Pagani was, and given medical attention.

On the 7th July, in rather better weather, Abram and Gallotti went up for the first time to Camp VI, setting fixed ropes along the route and returning by daylight to Camp V, finding there Rey and Solda, who had brought up some loads from the camp below.

Meanwhile difficulties had been developing with the Hunzas, five of whom had pushed off from the upper camps without giving any reason, abandoning their job. In agreement with Ata Ullah, I decided to sack three who had done very little work, either for reasons of health or from lack of good will; I also had in mind the need to make an example. The other five went up again to the spur, accompanied by Ata Ullah. I wanted to go up to the upper camps too, from similar motives, but was begged by my companions not to do so for lack of space in the tents. To lighten the labour of the Hunzas I had already, some time before, sent three of the Balti up to Camp II on permanent service, with excellent results.

On the 8th, Abram and Gallotti went up to Camp VI with loads of materials. The same day Rey went up to V and Bonatti, much recovered, left the Base Camp for the upper camps. But the weather had by now deteriorated, subjecting the mountaineers to great fatigue, which among other things gave Abram throat trouble. The three at Camp V had planned to come down the next day to a lower camp, but the prohibitive weather conditions forced them to remain where they were. The storm got worse the next day, turning into a real tornado.

In the early hours of the afternoon Ata Ullah arrived at the Base Camp with the Hunzas and the Baltis; later Abram, Gallotti, Rey and Solda, came too, the first straight from Camp V and the last from Camp IV. Angelino, Bonatti, Floreanini, Lacedelli and Pagani had remained at Camp II and they too were asking for instructions what to do. It was a somewhat delicate moment inasmuch as the persistence of the bad weather and the wear and tear of man-power did not leave us with very rosy prospects for the ensuing weeks. On the 11th the squall became even worse and radio communication with Camp II was cut off. Radio Pakistan continued to forecast bad weather. In the morning I sent two of the Hunzas to Camp II to ask for news.

Despite the unfavourable prospects, on the 12th the storm diminished, and Bonatti and Lacedelli profited from this improvement to go up with two Hunzas and loads from Camp II to Camp IV. The next day I decided to go up myself. I had written a message to encourage my much tried companions after such great

fatigue and I desired to convey it aloud also to those remaining in the camps. Compagnoni, Rey, Viotto and Fantin went with me. We quickly reached Camp I, situated as you know, near the top of a cone of detritus, and then, following the fixed ropes along the edge of the snow slide, we reached Camp II about midday. There we found Angelino, Pagani, Floreanini—the last mentioned badly bruised by his recent fall, and the others much vexed by the desertion of the two Hunzas who were to aid them in transporting the winch and had gone down to the Base Camp instead. Bonatti and Lacedelli were at Camp V.

On the 14th July the weather remained comparatively good: I prepared another message by which I gave Compagnoni, who had shown exceptional resistance and strength of character, "the function and responsibility of directing the attack on the summit".

I was informed by radio that Compagnoni and Rey had arrived meanwhile at Camp V, while Bonatti and Lacedelli, after having carried loads from the upper station of the teleferic on House's Chimney, had in the afternoon gone up to Camp VI. If the weather should remain even slightly favourable we could really hope for an early conquest of the shoulder. But in the course of the evening, while Ata Ullah was listening on the large radio receiver, he announced the call-sign of our Skardu radio.

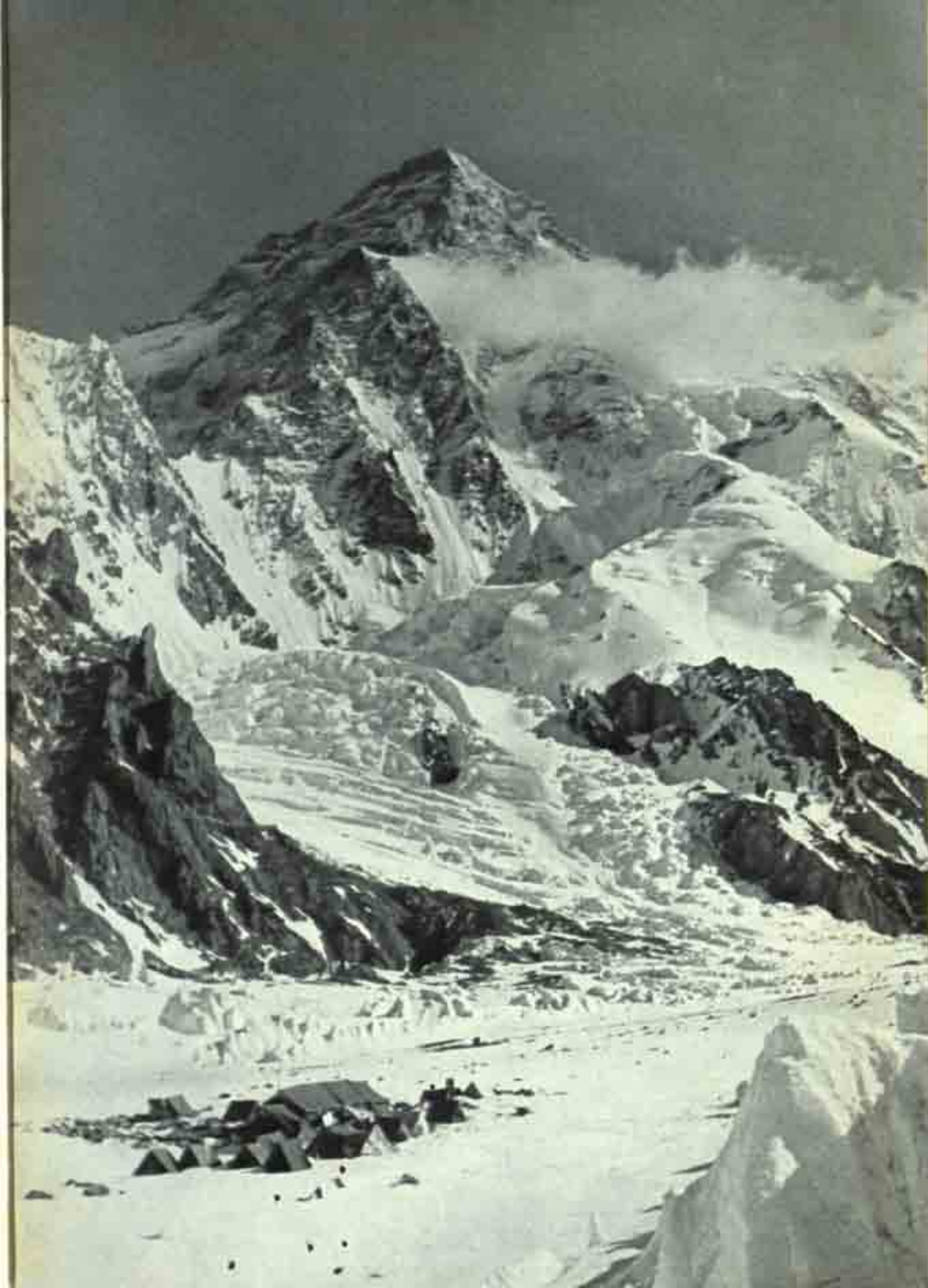
It was the voice of the radio-telegraphist of the O.N.U. calling us in conventional phraseology!

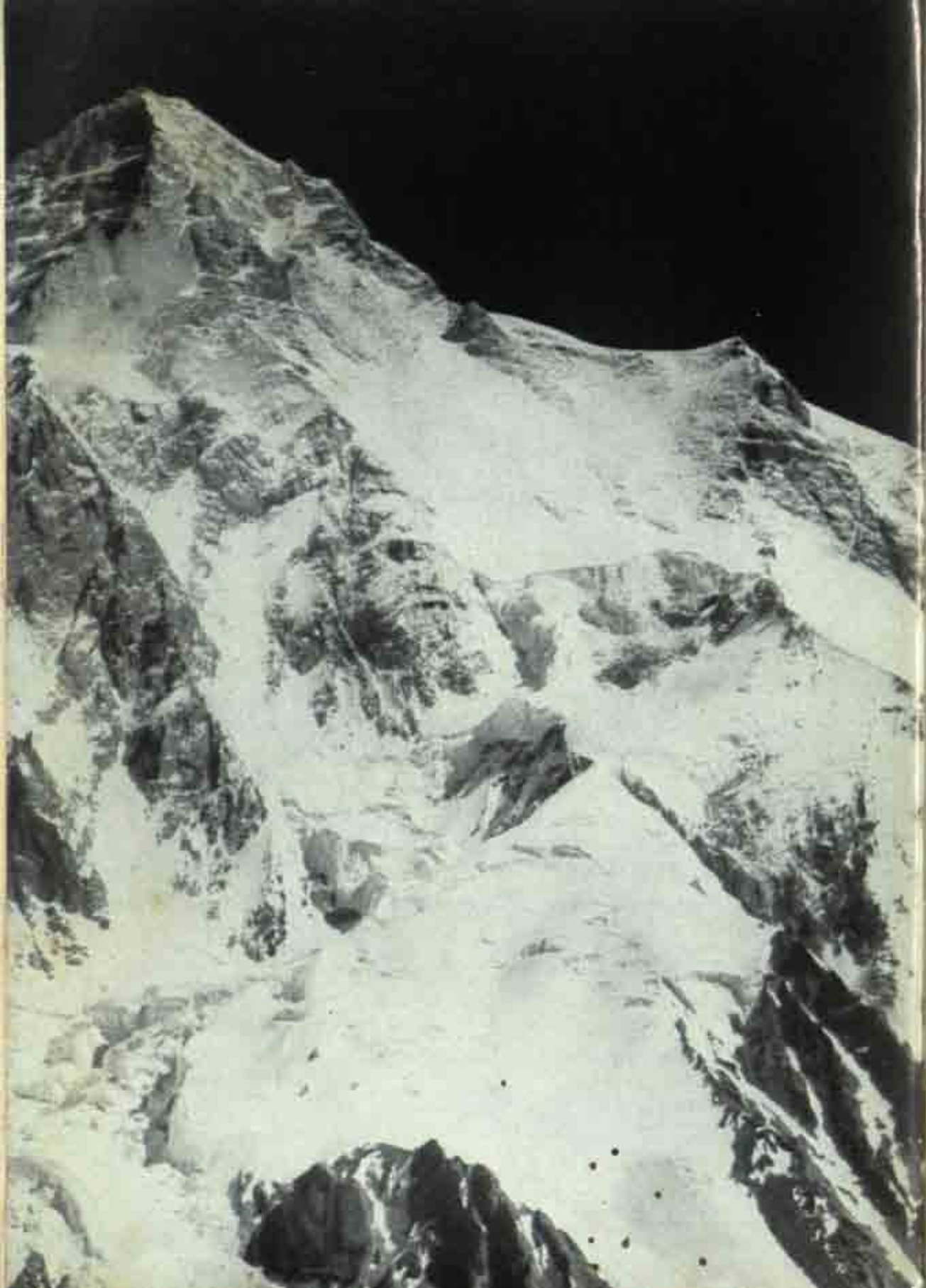
This was a most moving moment: for the first time in two months and a half we had at last succeeded in making radio-contact with Skardu and the civilized world.

That was a memorable evening even if we did not succeed in making ourselves heard by Skardu.

From the 15th the weather gave signs of deterioration: none the less Abram, Gallotti and Solda, who had been at the Base Camp for four days, went off for the higher camps with four laden Baltis, and on the 2nd reached Camp II with two bearers. The wind grew fiercer and fiercer that evening, presaging the storm which raged for the next two days and once more interrupted the shoulder-transportation by the sledge route echeloned between I and VI. On the 17th great masses of cloud, coming from the south-east, passed across the Negrotto Ridge and went on to stagnate on the walls of K2. The humid air and unusually high temperature had the characteristics of Central Himalayan monsoon weather:

Plate 11: Base Camp (16,400 ft.) of the Italian Karakoram Expedition 1954: a village of tents, on the Godwin Austen Glacier at the foot of K2. This glacier camp, both a temporary university and command post, was the storehouse and nerve centre of this magnificently equipped expedition. Complete with flagstaff and a four-roomed communal tent, furnished with a fitted carpet and tubular steel furniture, a high standard of comfort was maintained. By means of the radio equipment the expedition leader was able to enforce his orders right up to the high camps.





such must have been the impression my comrades in the spur camps, since they several times asked me for news of the monsoon and for weather reports for the days to come. But these could not have been more unfavourable. For my own part I had already more than once expressed my opinion on the monsoon, and I had no serious motives for changing it, the more so inasmuch as the expedition's own programme was based on the assumption that a genuine humid summer monsoon period did not occur in the Karakoram. I therefore left it to the judgment of those in the higher camps whether to come lower down or stay where they were. And when I learned that those who were the highest up would prefer to remain there for some days yet, I was really very satisfied.

In the evening the sky became clear once more and the atmosphere perfectly calm. In the afternoon of the same day Doctor Zanettin of the scientific party arrived at the Base Camp, and he volunteered to help us in any way with our mountaineering activities.

Our efforts to make better radio contact with Skardu had been continuing. Thus, at the 7.30 evening appointment, after receiving the call-signal perfectly, Skardu managed to hear well and correctly. It would be difficult to convey our joy and enthusiasm.

The idea that from now on we could transmit our news to Italy and receive theirs in the course of a few hours was of great comfort to us.

Thanks to the fine weather, the 18th July was a day of hard work for everyone, and a really memorable day for the expedition. Early in the morning Compagnoni and Rey left Camp V and, quickly reaching Camp VI, the ridge having been previously fitted up with fixed ropes, faced the famous "black pyramid" of the Americans, that series of large rock slabs covered with glassy ice and quadered with fresh snow, which, according to our predecessors' itinerary, must first be overcome before setting foot on the "shoulder". They were followed by Bonatti and Lacedelli with a heavy load of pitons and rope which they fixed along that most perilous path. A good 750 yards of fixed ropes were left on the wall on that laborious day! Meanwhile, at a lower level the transportation of victuals and materials was being carried out by the other mountaineers aided more or less efficiently by some of the Hunzas.

The distribution of the personnel in the camps on the evening of that day was as follows: Compagnoni, Bonatti, Lacedelli and Rey at Camp V; Abram, Gallotti,

Plate 12: The Abruzzi Spur which merges into the steep névé face about 6560 ft. above the glacier, forms a well-rounded shoulder 650 ft. higher up at 25,385 ft. From this point the névé rises steeply up to the rock band surrounding the actual summit of K2. The height of the peak was generally accepted in 1934 as 28,245 ft., and was recognised to be the second highest mountain in the world. The shoulder and summit zone remained the undisputed domain of the mountain guides Compagnoni and Lacedelli, as it would have been inadvisable and impossible to pass orders to them by radio at that height.

Floeanini, Viotto, and Fantin at Camp IV; Angelino with Solda and Pagani at Camp II. Next morning while those at Camp IV, except the last-named, came down to Camp III to get fresh loads, Abram and Gallotti climbed up to Camp V, where the third tent had been pitched, taking care at the same time of the transportation of the loads from House's Chimney to the near-by camp. Angelino, Solda, and Pagani had in the meantime moved from II to IV. Thus on the 20th July no less than six men met at Camp V.

The reconnaissance on the shoulder had shown amongst other things how inopportune it would be to pitch our Camp VII at the inconvenient and dangerous place where the Americans had placed theirs, situated at the foot of a precipitous cliff of ice and only a short distance away from the brow of a very deep rock-fall. It would be better to place our Camp VI 300 ft. higher, and to take our Camp VII to the site of the American Camp VIII, on the shoulder itself and in a fairly safe position.

This problem, which had been discussed with the help of photographs down at the Base Camp, began to find its solution on the 20th July with the ascent by Abram, Bonatti, Floeanini, Gallotti and Lacedelli with heavy loads to the new position of Camp VI and with the construction of a flat site for the tent. Their hard work was seriously impeded by a storm which did not permit them to pitch the tent that day, so that they had all to return to Camp V. And here, due to the really wicked weather, supplies were not coming up from the base at a sufficiently rapid rate.

Fortunately Compagnoni and Rey had gone down during the day to the upper station of the teleferic and managed to recover ten or so loads and convey them to the camp. The next day there was a most violent storm which once more forced us all to stay in our tents.

On the 22nd July the conditions were not good at Camp V, where too many people had gathered, requiring more supplies than the bad weather permitted to be brought up. I suggested to Compagnoni that the group be divided into two squads, one squad resting lower down, and ultimately at the Base Camp, while the other remained in waiting, so as to be able to profit from the first break in the weather to make a bridgehead on the shoulder and anyway to complete the equipment of the new camp.

In the late afternoon of that same day, just as the weather below seemed to be getting better, Compagnoni, Lacedelli, and Rey arrived at the Base Camp. The next day the transportation between Camps III and IV went on busily and on the 24th July, in quite good weather, the three at Camp V went up again to the upper VI, pitched a tent there and furnished it with supplies and victuals. That same day I left the Base Camp and went with Zanettin to the Saddle of the Winds (20,700 ft.), whence the shoulder of K₂ and the way up to the crest could be seen

very well. Compagnoni, Lacedelli, and Rey went with me too but left me at the base of the Abruzzi Spur to go on to the higher camps.

Advantage was taken of the improvement in the weather on the 25th July by Abram, Bonatti, Gallotti and Lacedelli, who moved to Camp VII, where three Hunzas with further loads also arrived that day.

With this move the spur could definitely be regarded as in our possession. The same day the three climbers who had left the Base Camp with me reached Camp V and the next day climbed on with Floreanini towards Camp VII, thus reuniting with their comrades. The relative rapidity and frequency of these changes from camp to camp may serve to demonstrate the enormous help the climbers got from the fixed ropes, and to show how well acclimatized they were.

On the evening of the 26th, Compagnoni, Abram, Gallotti, Lacedelli and Rey passed the night at Camp VII. Floreanini had gone down lower owing to lack of space in the tents.

On the morning of the 27th the sky was serene and the atmosphere clear and calm. Had the weather remained good it would have been possible to unleash the attempt on the top. But scarcely had I reached the Base Camp, on my return from the Saddle of the Winds, when the sky rapidly clouded over. The clouds came down low, and before evening it was snowing hard.

Throughout the 27th the weather remained adverse: towards evening Angelino and Viotto went down to the Base Camp in a state of great prostration.

When I looked at the tent in the small-hours of the morning of the 28th, our camp had resumed what one might call its usual winter aspect: during the night some inches of snow had fallen and these had whitened the long median moraine on which the Base Camp lay. But by way of compensation the weather gave signs of improving. With the exception of Bonatti, the climbers who had passed the whole of the 27th in the tents at Camp VII, waiting for the weather to improve, left promptly with loads of victuals, tents and stores. They ascended the ice slope, mantled as it was with fresh snow and forming the middle part of K₂'s shoulder, in search of a site for Camp VIII. But soon afterwards Rey, worn out, had to give up and so back to Camp VII. The others went on along the slightly inclined slope of the shoulder right to the foot of a high ice wall where Camp VIII was set up, a little under the point marked 25,400 ft. They put up a tent, and while Compagnoni and Lacedelli prepared to spend the night there, Abram and Gallotti were on their way back to the camp they had started from.

Towards evening the sky became quite serene again, and a cold wind blew from the north, foretelling a decisive improvement in atmospheric conditions.

Next day, the 29th July, the weather being good, Compagnoni and Lacedelli attacked the wall of ice that rose above Camp VIII. After many hours of manœuvring and of indescribable fatigue, these two finally succeeded in setting

foot on its brow. But by now it was too late to go on, and they were obliged to go down again by the fixed ropes as far as Camp VIII, leaving their loads at the top of the wall. At the same time Abram, Bonatti, Gallotti and Rey left Camp VII with two complete oxygen respirators, a tent, and other camping material, in the direction of Camp VIII. But quite soon afterwards Rey, and later on Abram, were forced to retire, leaving their loads on the snow. They were exhausted: Rey felt that he could not go on further, so he came down from Camp VII. But Abram, who was still strong, remained there. Meanwhile Bonatti and Gallotti had reached Camp VIII, where they put the second tent up alongside that of Compagnoni and Lacedelli. The two oxygen respirators had been left half-way between Camps VII and VIII.

The 30th July was a splendid day with a limpid sky and a calm atmosphere. From Camp VIII Compagnoni and Lacedelli again ascended the wall of ice, picking up the loads which they had abandoned the day before, and continued towards the precipitous channel cut in the rock wall standing below and in front of the terminal blanket of ice. The snow was abundant and powdery; they sank in up to the waist. Higher still progress became even more exhausting. After reaching the foot of the channel, threatened by the fall of icicles from the overhanging ice at the top, they bore to the left, and went under the ice-encrusted rock wall; they overcame a series of difficult pitches and succeeded in pitching a small tent on a small and narrow terrace at about 26,400 ft. In the morning Bonatti and Gallotti went down towards Camp VII to recover the respirators left by their comrades at a half-way point; they succeeded in finding them and were back by midday at Camp VIII. Meanwhile, during the first evening two Hunzas, Mahdi and Isakhan, continued with Abram towards Camp VIII, carrying victuals and camp equipment. At half-past three in the afternoon Abram, Bonatti and Mahdi put on their respirators and followed in the tracks of Compagnoni and Lacedelli. But after a while Abram returned to camp, where he arrived at 7.00 p. m. The other two continued heavily over the fresh and powdery snow. The march went on till late in the twilight; night was now at hand. The two of them called out to Compagnoni and Lacedelli, but the wind blowing from the north blotted out their voices for some time. Their comrades suggested that they should go down again, because under Camp IX there were very steep places covered with ice which it would be terribly hard to try to pass in the dark. After taking due account of the impossibility of descending without grave risk to life, the two men dug a hole in the snow, fitted themselves into it and prepared to spend the night there, a night which must have been a grim one at that height.

THE SUMMIT. *By Achille Compagnoni and Lino Lacedelli.*

On the 30th July we left Camp VIII, situated at about 25,400 ft., to go and prepare Camp IX, which was to consist of a single very light tent. An ice-wall was overcome only after several attempts; we had to overcome a series of treacherous places by means of a traverse with frightful overhangs.

We ascended as far as possible, till we reached the base of a chain of rocks cutting the end part of the east wall, constituting for us a dangerous *terra incognita*. About three in the afternoon we set foot on a small secondary crest where it was possible to set up the small high-level tent. We estimated the height of Camp IX at about 26,250 ft. Abram, Bonatti and a Hunza were to have joined us the same night. It was their task to bring us the cylinders for the oxygen apparatus which we would have to use in our attack on the summit.

The bad weather which had dogged us for forty days had held up all transport operations and the plan of attack had undergone inevitable modifications. Thus only a few cylinders were available, and these were to serve only for the decisive attack. The weather was serene. But our eyes were not turned to the marvellous panorama; until the first shadows fell, they were scrutinizing the arduous wall of rock above us, which was to open or block our way to the summit.

As the hours passed our anxiety increased: we had brought not one single cylinder of oxygen with us, and if our comrades had not arrived we would have found ourselves gravely embarrassed. But our decision had been made: with or without oxygen we would somehow have made the attempt.

Fortunately for us, towards four in the afternoon we perceived three small figures laboriously working their way up the precipitous slope, and they revealed themselves as Abram, Bonatti and the Hunza Mahdi. But would our comrades succeed in reaching us before nightfall? We feared not. They had still a long way to go, and the sun was already sinking behind the crest of K 2. Soon after that Abram left his companions to descend again to Camp VIII, while Bonatti and Mahdi continued their way towards us.

It was almost night now, and Bonatti and Mahdi had not yet reached the difficult traverse of the bad spots. This traverse in the dark would have been extremely perilous. Soon after this we heard shouts. We could not understand the words, because the wind blew them away. But what we thought we heard was that Bonatti wanted to come on and join us while the Hunza disagreed and wanted to go down again. We shouted to Bonatti to leave the respirators and go down again. From his silence we inferred that he had followed our advice. It would have been crazy to bivouac without tent or sleeping bag, and equally risky to try to push on in the dark over the bad patches.

We went back into our tiny tent to pass the night. The cold was intense and thirst tormented our parched throats. On the other hand we were not at all hungry, so we limited ourselves to absorbing a little soup and a number of cups of camomile tea. It was the only drink which gave us any relief.

We stretched out on our sides in the only position permitted by the limited space, hoping to sleep a little; but in vain. Then we began chattering, talking naturally enough on the one theme only. We asked ourselves what the ascent over the rocks would be like, and if Walter and Mahdi had brought us enough oxygen, and if the weather would be propitious. The night seemed endless.

Scarcely had dawn made the skyline clear than we bounced out of our refuge; our first thought was of the weather. It seemed that we had deceived ourselves; above us the sky was clear of clouds, but below us there was a solid curtain of mist. While we tried to spot the place where our comrades had left the oxygen respirators, to our surprise we saw a figure descending the slope. We could not make out who it was, and by shouting we only succeeded in stopping him a moment in his course. We lost ourselves in hypotheses of the most disparate kinds. The truth was incredible: Bonatti and the Hunza had passed the night in the snow.

At five in the morning we were equipped and ready: nothing remained but to put on our crampons, rope up and set out. In an attempt to bypass the dangerous spots we decided to ascend a little and then descend in the snow. We soon found the place where Bonatti had spent the night; we loaded ourselves with the respirators, with three oxygen cylinders each. There followed a moment of hesitation, for the weather was not promising. But Compagnoni cut short all delay by deciding to make the attempt. It was a quarter past six when we began to ascend towards the rock that barred the way to the east wall. The oxygen permitted us to breathe more easily, but the weight of the respirators (40 lbs.) and the masks caused us a good deal of inconvenience.

Sweeping the snow from every hold, we soon got to the foot of the final wall. In front of us stretched the great ice-channel attacked direct by Wiessner fifteen years before. Then the channel had been clear of snow and firm, but now not only was the bottom, but the whole channel was covered with such a mass of snow that an attempt was clearly impossible. We were equally unsuccessful in our attempt further to the left. The rocks which, seen from below, seemed so climbable, were not in the least climbable when face to face. These vain attempts occupied two hours. Finally we decided to attack the wall immediately to the left of the channel. Compagnoni managed to get up a few feet, but, tripped by his crampons, which had no grip on the rocks, he suddenly lost his balance and ended up in soft snow. Fortunately his fall had no evil consequences.

It was now Lacedelli's turn. He began by taking off his crampons and his gloves. Difficulties which technically are not very great at heights like these

become enormous. On the rocks Lacedelli got on fairly well without crampons; the difficulties began again once he was on the snow. A little later, Compagnoni took the lead on the rope, and a wall of ice barred our way. Taking turns in leading, we managed to ascend the passage by scrambling up the treacherous spots. In the meantime the first oxygen container was exhausted.

Any hopes that the worst difficulties had by now been overcome soon proved illusory. A terribly steep snow slope awaited us. Finally, after surviving a number of perilous slips, we managed to get our feet again on to firm rock.

After first casting about, then scaling a rock chimney, we came to the rim of an abyss over-hanging the Godwin Austen Glacier. One false step and in an instant we would have been at the Base Camp! At that moment Compagnoni, removing the mask in order to speak, reported that the second oxygen container was practically empty. We continued our upward path, veering towards the left. A rocky crest allowed us to diverge towards the centre of the east wall; then we went over a stretch of hard snow. Next we arrived, so far as we could understand it, at the centre of the large rounded dorsal "fin" which terminates in the summit itself. That did not mean that we had come to the end, for indeed the slope became even steeper.

Through an unexpected rift in the clouds we caught a momentary glimpse of the tents at Camp VIII, and in the microscopic dots around it we divined that our companions were certainly following the phases of our ascent with anxiety.

But suddenly a shortness of breath, a sudden glow of heat, a trembling of the legs, made us aware that the third and last oxygen container had also come to an end. By taking off our masks and breathing deeply we succeeded in overcoming the sensation of illness, while the supposed proximity of the summit and the weather (which showed signs of clearing) stimulated our energies.

Our first impulse was to free ourselves from the dead weight of the respirators, but we refrained, partly because removing them would call for a complicated and dangerous manoeuvre on that snowy slope, partly because time was pressing, but also because we thought our goal was closer than it actually was. We could leave the respirators on the top, as solid testimony of our victory!

When we had passed the prominence that rose before us, we believed that we had reached the end of our labours, but a bitter disillusionment awaited us: behind it was another terribly long slope. The hammering of our hearts imposed frequent halts and slowed us up; an insistent buzzing in our ears disturbed us. By good fortune, and contrary to what we had supposed and heard of the tricks which those mountain heights can play, our psychical condition remained practically perfect.

The temperature was extremely low, perhaps 40° (C.) below zero; a cold wind had swept away the clouds and the glaciers were now shining in the sun.

In this light we noticed all of a sudden that the slope was no longer so precipitous; it was getting almost level; finally it ceased altogether. It almost seemed untrue; nevertheless, we were on the summit. We assured ourselves of this by looking to the north, where there appears another elevation, doubtless the false summit visible from the Base Camp. To eliminate every doubt, glancing level at the horizon, nothing projected above us.

First, we were moved to an emotional embrace. Then, stretched out on the snow, we tore off the respirators; to an ice-axe we fixed a ribbon with the Italian colours, one with the colours of Pakistan, and a small labarum of the Italian Alpine Club, these forming a token to leave behind on K2. It was six in the evening: the sky, quite clear of clouds, allowed us to admire the marvellous panorama; 12,000 ft. in depth separated us from the Base Camp, which we could see if we looked down into the abyss of the Godwin Austen Glacier, while from the eastern brow we could see the tents of Camp VIII, our only salvation.

But there was no time for contemplation, nor for the memories which crowded into the mind: we had to take the film, and the photographs. To do this we were forced to take off our gloves, which caused us real torment in the icy wind and gave Compagnoni a touch of frost-bite in the left hand.

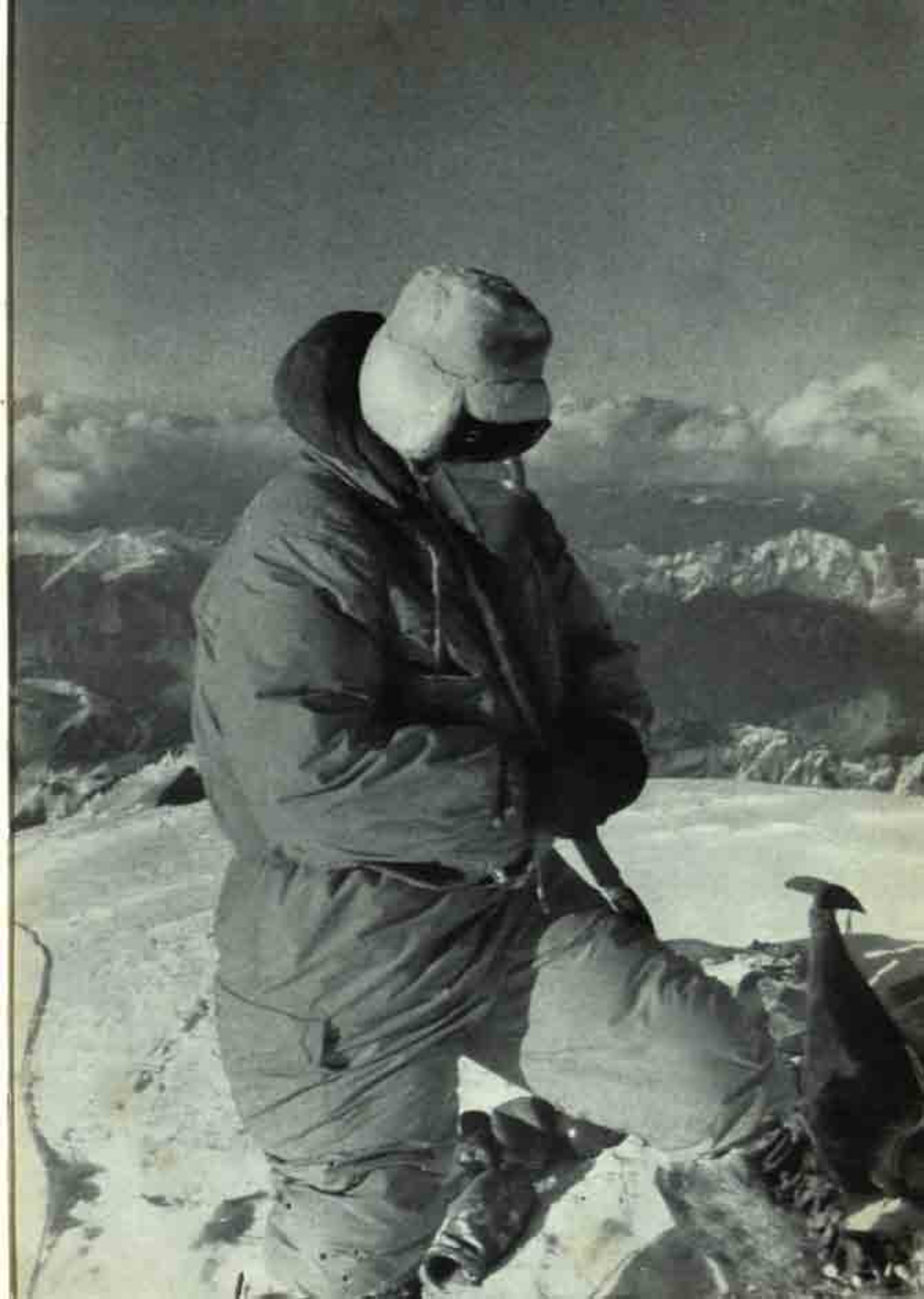
We gave no thought to eating or drinking and, after a half-hour's rest, began the return journey. Our gloves had become two bits of ice, and we had to cut them right down to the wrist in order to get them on. Without any thought of retracing the way we had come, we followed the line of greatest slope.

Sunset faced us with the great problem of the dark, and all the more so since the descent was slow; fatigue increased with every step, and we had to rest every now and again to massage our fingers one after the other. Soon afterwards the summit was wrapped in darkness; only the light of the stars, reflected in the snow, gave out a vague luminosity. We now had recourse to an electric torch.

When we reached the level of the traverse under the ice-wall, Compagnoni slid on one of the treacherous places, but managed to stop quickly in the deep snow. Further on we recognized the beginning of the vertiginous channel running down to Camp VIII. We decided to go straight down it. Anxiety, weariness, thirst, the joy of victory, had deprived us of all contact with reality: suddenly we realized that we had reached the place where in the morning we had found the oxygen respirators and left the sacks. A very brief stop and a gulp of brandy from a tiny flask found in one of the sacks gave us fresh life. We resumed our march on the plateau.

The torch was by now exhausted and the danger of crevasses—which we knew to be many in this zone—forced us to advance with every precaution.

Plate 13: Achille Compagnoni, mountain guide and ski instructor from the Val Fureva, on the summit of K2.





Caution did not suffice to prevent our slipping wildly down and finishing up on lower rim of one, escaping the abyss by a miracle. Lacedelli, in falling, let go of his ice-axe which shot off, leaping wildly down the precipice into the abyss, tinkling as it went.

We straightway resumed our descent, practically without recalling the route, trusting greatly to our instincts. We must now be in the neighbourhood of Camp VIII, and this thought spurred us to a final effort.

Almost without considering how we had come, we saw that we were on the upper rim of the ice-wall which towers above Camp VIII. As if our fatigue was not enough, we had to get down in the dark where the wall was highest.

Compagnoni, who was leading, did not notice that at a certain point the ice incurved, creating a vertical drop, under which a crevasse lay open; suddenly he found himself shooting into the void. While Lacedelli, who held the safety position on the rope above him, was trying in vain to hold him with his frozen hands, he was precipitated some fifty feet, but fortunately finished up in soft snow. Lacedelli, by a miracle of the same kind, came to a stop on the edge of the precipice, thus avoiding falling upon his comrade and destroying him with his crampons.

When Compagnoni had assured himself that there had been no evil consequences from the fall, he got up and managed to suggest to his friend a better way of descending the dangerous passage. This did not avail to prevent Lacedelli, too, from accomplishing a short flight, after being caught by a patch of ice.

By now there were few difficult passages left us, and none to cause great alarm. We hurried across the "shoulder" slope, shouting at intervals in the hope that our friends would hear; there was no reply but the whistling of the wind. Finally we caught sight of the camp; light gleamed from one of the tents.

In less time than it takes to tell, we were in our comrades' arms—Abram, Bonatti, Gallotti, the two Hunzas Mahdi and Isakhan. They took the sacks from our backs, made us tea and bombarded us with questions. In our words we lived through the marvellous adventure again, to such an extent that we could not get to sleep. Our joy was great, and so was the pain in our fingers, which earlier were numb and now began to hurt atrociously.

THE SCIENTIFIC RESEARCHES. *By Ardito Desio.*

I have already indicated the lines of study to which the expedition was to devote itself. I should explain here that our scientific programme was no isolated one; it has to be considered within the framework of earlier scientific studies. The 1909 expedition, organised and led by the Duke of Abruzzi, involved a series of scientific studies in the western Karakoram in the field of geography, geognostics, meteorology, botany, zoology and physiology; Filippi's expedition of 1912/13 took place mostly in the eastern Karakoram and scored a really exceptional success in the field of geographical exploration, also in geology, geophysics, anthropology and so on.

Another Italian expedition, the original aim of which was mostly concerned with mountaineering, but which for various reasons developed only a scientific activity, was busy in the western Karakoram in 1929 under the leadership of the Duke of Spoleto. It is to this expedition—in which I myself had the honour of participating—that we owe wide researches of a mainly geographical and geological character, and to a more limited extent geophysical, zoological and botanical. The territory in which these studies took place coincides in part with that visited by our expedition, while in collateral zones various kinds of studies have been made by other expeditions, especially by English and Dutch.

In the field of geographical exploration it was principally on two areas that we concentrated our researches: that of Stak, in the middle Indus basin, and certain lateral branches of the Baltoro Glacier. The previous year's reconnaissance of the Stak region had given me the idea that the known geographical data on that territory, which lies on the south-west slope of the Haramosh group, were extremely poor and that even the large-scale maps gave a quite erroneous representation of them. This concerns the hydrographic basin of the river Stak, which flows in on the right of the Indus, and was made famous by the exceptional advance of a glacier which moved over seven miles in the course of three months the previous year. During May and June 1954 it was explored, mapped on a scale of 1:50,000 and studied from the glaciological point of view by Marussi, Zanettin and Lombardi, who went all over it. The documentation they collected, together with the data of the previous year, can give us not only a complete and circumstantial picture of the region, but information also on this very extraordinary glacial phenomenon, which was verified from the spring to the summer.

From the Stak region and the valleys of the Shigar and the Braldo, which are bathed by the waters from the melting Baltoro Glacier, there opens a second valley called the Turmik Valley, which I visited in 1953. The interest it aroused in me on that occasion was such as to suggest to me a more complete study, which was carried out by the expedition's topographical and geological group.

According to our general plan, on the 20th July there was to be a meeting at Urdukas, on the Baltoro Glacier, of all my scientific colleagues with the exception of the paleontologist. But that same plan—at all events in its most probable solution—had assumed that the attack of K2 would have ended by then.

Just at that time, however, I was still deeply involved in the development of the purely climbing part of the expedition's work and was not yet able to give myself freely to scientific work. I had sent new and detailed instructions to my collaborators, but my correspondence with the scientists, which was slow because it was carried by local messengers, had been held up at Skardu, so that the final arrangements did not reach their destinations in time to be of use. Thus Doctor Zanettin arrived at the K2 Base Camp on the 27th July, considerably in advance of the contemplated date, while Professor Marussi and Captain Lombardi only arrived at Urdukas on the 16th August, notably late in terms of the final programme.

These set-backs did not compromise the development of the work. On the 7th August, that is to say one week after the conquest of K2, when I was busy organizing the return of the mountaineering party to Italy, I left the K2 Base Camp with Doctor Zanettin and carried out a week's reconnaissance of a geological nature in the Upper Baltoro; from there I returned to Urdukas, where the Base Camp had meanwhile been transferred.

Then with Zanettin I explored the Younghusband Glacier, one of the Baltoro's biggest tributaries, ascending a pass 18,000 ft. high at its head and penetrating the northern slope of the great chain, in the basin of a glacier which I had already explored in 1929, the Sarpo Laggo Glacier. The new pass, which I named Moni La (it does in fact give access to the Moni Glacier Basin, an affluent of the Sarpo Laggo), can without any serious difficulty provide a way across the Karakoram chain even for a caravan of bearers.

On the 18th August I separated from Doctor Zanettin, to whom I had entrusted the task of exploring the Vigne Glacier, another affluent of the Baltoro, and at Llungka on the right of the great glacier met the topographic-geophysical party, which proceeded on the next day to carry out the large-scale survey (1:5000) of K2, and also of certain Baltoro affluents on a scale of 1:75,000. In fact the general programme went on to complete the photographic survey of the Baltoro, which was only carried out in part by the 1929 expedition.

Returning to Urdukas on the 20th August, I set off alone for Askole, where on the 27th I was joined by Doctor Zanettin.

While the latter was preparing to go on and cross the Skoro La (16,650 ft.) in order to reach the Shigar Valley, perfect his geologico-petrographic labours and then return to Rawalpindi by the Skardu route, I was organizing a light

caravan to cross the Hispar Pass (16,900 ft.) and from there continue to Gilgit and Rawalpindi.

I left Askole on the 30th August and went again up one of the largest glaciers of the western Karakoram, the Biafo Glacier—40 miles long—reaching its head, with the famous Snow Lake, on the 3rd September and pitching camp that same day on the Hispar Pass. I then descended the Hispar Glacier, about 25 miles long, and left it on the 7th September, stopping a day at the first village at an altitude of about 10,000 ft. On the 9th September I resumed my descent towards the valley, visiting the two small states of Nagar and Hunza on the way, and arrived at Gilgit on the 17th September. I stayed at Gilgit for two days in order to carry out some geological reconnaissances thereabouts, and on the 20th September transferred myself by air to Rawalpindi, where I was suddenly joined by Doctor Zanettin who had arrived from Skardu. I rested for two days at Rawalpindi, being received with great demonstrations of esteem and admiration by the political and military authorities of Pakistan, and on the 24th September I left by car, still with Doctor Zanettin, for Peshawar, from where the next day I crossed the Khyber Pass and proceeded to Kabul, the capital of Afghanistan. This excursion had the double aim of carrying out a series of geological control observations along the road and of examining the possibility of a future extension of our geological researches to the Hindu-Kush Range when our work in the Karakoram was ended. When, with the aid of our Legation, a scientific mission to Afghanistan had been arranged for the next year, I went back to Rawalpindi on the 30th September, leaving the next day for Lahore, and the day after that, the 2nd October, for Delhi. The aim of this visit was to settle the details with the India Survey for a gravimetric link between Karachi and Delhi, which in fact took place later, thanks to the work of Professor Marussi and Captain Lombardi. On the 5th October I re-entered Karachi for the last time. I had been preceded by Doctor Zanettin, and with him I left three days later for Italy, arriving in Rome on the 8th October.

Meanwhile Professor Marussi and Captain Lombardi, having completed their topographical survey work and finished their gravimetric and magnetometric measurements in Baltistan, were, as I said, continuing with a view to establishing the gravimetric link between Karachi and Delhi. Later on, the tasks were divided up, so as to complete, in collaboration with the workers of the Military Geographical Institute, the gravimetric link between Karachi, Beyrouth and Rome.

At this point we can briefly summarise the scientific work done by the expedition.

Geography: Investigation and collection of data and descriptive reports on all territories visited; completion of photometric surveys of the Stak territory, with particular regard to the basins of the Kutiah and Goropha glaciers on a 1:50,000

scale. Table survey on a scale of 1:50,000 of the Stak's Base Valley and that of the Askor, and a photometric survey of the Turmik Valley at 1:100,000. Photogrammetric surveys of the K2 massif on a scale of 1:5000, and of the Baltoro's principal tributaries, which was not done in 1929, on a scale of 1:75,000. Measurement of the flow of the glaciers by the photogrammetric method. Setting up astronomical stations at Skardu, at two places in the Stak Valley, at Sasli (Haramosh) and at Gilgit, on which to base the geodetic and topographical surveys. Professor Marussi and the Pakistan topographical assistant Badshajan, as well as Captain Lombardi, participated in this work.

Geological: Investigation, geological surveys (mostly on a scale of 1:50,000) and petrographic studies of the mid valley of the Indus between Skardu and the Stak Valley, of the Stak Basin and the Turmik Valley. Researches and detailed geological surveys (1:75,000) of the Baltoro Basin and more rapid ones in the Riafo, Hispar, Braldo and Shigar Valleys (1:253,000). We identified vast areas composed of endogenous rocks of various types, with granite prevailing, and we studied them in relation to the metamorphic rocks. A number of fossils were investigated in the upper Baltoro, where sedimentary and semi-metamorphic rocks are also abundant.

It was Doctor Zanettin and I who devoted ourselves to these studies. The materials collected fill twelve cases.

Geophysical: Researches in this field were devoted above all to gravimetry and magnetometry. From the point of view of the former we carried through the gravimetric linkages between the base stations of the following places in Pakistan: Karachi-Quetta-Lahore-Rawalpindi-Murree-Skardu-Gilgit. We furthermore carried through gravimetric survey work on the Skardu-Gilgit line, along the Indus Valley and of the following lines, Stak-Turmik-Braldo-Urdukas (Baltoro)-K2; and Skardu-Parkuta and Gilgit-Daman towards the Chitral. Further linkages were carried out of Skardu-Rawalpindi, Karachi-Delhi, and Karachi-Beyrouth-Rome.

As for terrestrial magnetism, we carried out the linkages of the base station at Rawalpindi with that which we had set up for registration purposes at Skardu, and we carried out the magnetic surveys along the same gravimetric lines.

These researches and measurements were carried out by Professor Marussi, in collaboration with Captain Lombardi and the Military Geographical Institute. In due accord with agreements made before our departure, I had received a packet of plates for studying cosmic rays from the Institute of Physics at Milan University, which were brought by Professor Giovanni Polvani. The plates were carried up to Camp VI, but owing to a misunderstanding they were forgotten up there and I did not find it opportune to send anyone back for them, having regard to the risks that would have been involved.

In conclusion I should mention the daily meteorological observations carried out not only by me but also by the geophysics man and collected by the station set up at Skardu, which had been equipped with recording instruments.

Zoology and botany. The territory visited by the expedition is on the whole poor in animals and plants, as befits its notably desert-like character. Moreover, a number of expeditions have recently visited Baltistan with the aim of making zoological and botanical collections, more than one the previous year. Therefore it was not appropriate to swell our already complex organization by adding personnel specialized in these matters, and the more so inasmuch as pretty full collections had been made by an expert in the same region during the 1929 expedition.

I none the less invited my colleagues to collect fauna and flora at heights above 13,000 ft. where it is more difficult for the naturalist-collector to stay any length of time. I myself devoted time to these collections, which are fairly complete and deserve expert study.

Ethnology and palaeo-ethnology. I have yet to mention the studies entrusted to Professor Graziosi in the fields of ethnology and palaeo-ethnology.

The programme provided for the study of the populations of the following zones: Chitral, Hunza and Astor, and for palaeo-ethnological studies in the Peshawar and Rawalpindi zones. However, for reasons which remained unknown to us, the Pakistan Government refused Professor Graziosi a permit for carrying out the ethnographic work, so that he was only able to devote himself to the palaeo-ethnological enquiries, exploring large sections of the alluvial terraces of the Indus, the Sin, the Soan and the Jelum, where I had the luck to discover numerous prehistoric sites attributable to the Lower Palaeolithic with amygdaloid industry and chipped flint industries of a far later age; and of these I was able to produce a rich collection. I further discovered in the Rawalpindi area the remains of villages with neolithic cultures, gathering here too a fine heap of materials represented by ceramics and stone industries.

During my stay in the Punjab I was able to work on strata containing mammiferous fossils, and made quite a collection of these. The collections brought home by Professor Graziosi fill about twenty cases.

This is, in brief, the work done by the 1954 Italian Karakoram Expedition in the scientific field. It is now necessary, as I indicated first of all, to increase the value of these field studies by laboratory research and desk study; to this my most immediate collaborators and I must dedicate ourselves, but so also will other students to whom particular jobs will be farmed out. Without that our labours would be sterile, and only when their results have been turned into the five contemplated volumes shall we be able to say that the expedition has completely fulfilled its task. This is the task that remains to me and which I have confidence I shall be able to carry out within three years.

MIDGET AIRCRAFT ON MOUNTAIN GIANTS

A discussion of an age-old wish-dream

By Othmar Gurtner

As far as my own memory reaches, a true horseman's saddle was never complete without its canvas slit-bag; stuffed full with the oat ration and closed by twisting it tight in the middle, it was firmly tied to the saddle-bow. The accompanying fodder-net, for carrying a hay ration obtainable en route, also demonstrated that, even during the short marches across our Alpine passes, care had to be taken that the nose-bags of saddled or led horses must not remain empty in a strange stable or in the grassless wilderness. It is, of course, a considerable step from such animal-loving care to the very frontiers of cannibalism from which a lost polar expedition shrank in utter emergency by "rationing to the last sledge-dog".

But even the most recent expeditions, when we consider the uncertainty of their course, demonstrate the rule: hope for the best but be prepared for worse. In this cautious basic attitude we see the duty for each enterprise to calculate the physical strength, provisions and equipment of its members so as to correspond with the greatness or remoteness of the expedition's aim.

The exploration and mapping of the mountain chains of Asia, out of which rise the last eight-thousanders, the seven-thousanders, to be estimated by hundreds, and the still uncertain number of the many six and five-thousanders, presents man, for decades to come and in endless variation, with a playground for his old passion: the pursuit of the Unknown.

The Way to the Mountain

In the great plain of Northern India the fan-like river systems close in as they near the Arabian Sea or the Gulf of Bengal; but in the direction of the mountains they spread and their branches reach out behind the Himalayas, through deep depressions, up to the water-shed of the Karakoram and Transhimalaya. Therefore, whoever seeks to conquer one of the giant mountains has to bring his supply column out of the plain to the mountain wall before he can penetrate, across difficult passes and through the gloom of stone-filled gorges, into the mountains themselves. Every expedition of any size discovers that its supplies, weighing some tons, are best left in their packing cases so long as they are still

able to go forward by rail, road or plane, because the development from bulk transport into the more mobile method of porters' loads inevitably involves the employment of caravans that absorb both time and money. It is therefore customary today to advance the Distribution Point far up the river fans, as far as mechanical means of transport will go and comparatively near the mountain. Airports like Kathmandu or Skardu have therefore become Distribution Points of this kind, although from these points the caravans have still to push on for some weeks before they reach the giant mountains.

Caravan porters, men and women, are day-labourers. They have increased their capital since childhood: the strength of their backs and necks (so that they can carry heavy loads with the forehead strap or in the large baskets they carry on their backs), their bare soles (horny from use on the roughest terrain), and very often a sunny nature which, content with barley flour and rice, still finds reason to smile. The caravan creeps like a caterpillar across the water-sheds between the rivers and eventually finds in a glacier basin the site where the expedition intends to set up its *Base Camp*.

But the structure of the mountains themselves is by no means a continuously rising slope, on which the supplies can be pushed up towards the summit by unvarying forms of transport. If one looks from an advanced view-point at the surrounding summits one notices at once that from area to area their heights align themselves in an extraordinary similar way. However, this summit floor should not be considered as the remains of an old surface. It is rather the result of similar elevations and similar conditions of denudation to which the affected massifs were exposed. The most important influence on the summit heights was the *erosion basis*; from the surrounding valleys the running waters attacked the mountain mass uniformly; but where high-lying plane surfaces interrupted the gradient by steps this protection against erosion left its mark further up in slightly raised mountain tops. The summit floor then formed a step, a transition from the old surface mentioned above to a higher level of the mountain range. But individual mountain massifs can also experience protection from level collars like these so that their depth of denudation is determined not by the low, general erosional basis of the region but by their own protectively protruding shoulders. From these "shawls", slung round the mountain tops, developed those big shelves that lean high up towards the summits, as shown—to cite examples in the Karakoram—equally by K2, Rakaposhi and Nanga Parbat; but they can also be identified unmistakably in Garhwal on the south saddle of Everest. Between the water-draining glacier basins that are reachable by the caravans, where the Base Camps are erected, and these shelves that are raised into the thin air of great heights and literally invite one to establish an Upper Base, the Great Steps rise; across their

difficult and often dangerous terrain the supplies have to be carried up from a height say of 18,000 ft. to 24,500 ft.

It should be possible to consolidate an *Advanced Base* like this in such a way as to establish at great height a starting point from which a chain of *High Camps* can be added as required and pushed up close to the summit; it should also form a line of defence which, with the sudden occurrence of bad weather or unforeseen incidents, can assure sheltering warmth, food, and rest for a sufficient interval.

A survey of this long and sectionally divided supply route thus shows in nearly all cases such a uniform pattern that we can arrange our thoughts almost schematically: from *Distribution Point* the goods are conveyed by caravan to *Base Camp*; the necessary supplies are then carried to *Advanced Base* on the backs of porters employed as teams (about whom we shall have more to say later) and from there, using the actual climbers and the high mountain porters assigned to them (e. g. Sherpa or Hunza), the *High Camps* are pitched and the starting positions for the summit assaults are taken up in the highest support points.

It seems that the vaguest ideas exist about the overcoming of the *Great Step* between the *Base Camp*, in a comparatively easily accessible glacier basin, and the *Advanced Base*, which is reached only over difficult terrain and in a rarefied atmosphere. Here it should be made clear that the bare-footed native, whose needs are so few and who works contentedly and reliably in the caravan between *Distribution Point* and *Base Camp* is unsuitable for employment at the *Great Step*. He is not sufficiently accustomed to height (acclimatisation) and he lacks suitable footwear and the indispensable mountaineering equipment, as well as adequate practice in its use. The *change of porters at Base Camp*, with the bringing up of numerous special porters equipped for the *Great Step* and trained for the task, puts the expedition to additional trouble, risk and expense. For while the caravan porter was still able to live "off the land", work at the *Great Step* is carried out under conditions which make a supply of food for the special porters unavoidable. Hitherto this difficulty has given great trouble to every large expedition and has nearly always critically endangered the expedition itself. Again and again the high mountain porters, as well as the climbers, intended as an elite for the *High Camps*, have had to be employed at the *Great Step*; in that way the irreplaceable strength of the expeditions has been exposed to premature wear and tear. Instead of saving and gathering their strength for the maximum effort in the zone of the *High Camps* and at the summit, as was intended, their preparedness was endangered often to the very point of failure when eventually put to test. Actually, if the history of the ascents of eight-thousanders that have been accomplished so far be examined, the serious crises accumulate significantly as the result of the poor equipment of *High Camps* just beneath the summit zone; this clearly defined phase of the process of exhaustion can in the first instance nearly always

be traced back to the use of climbers and high mountain porters in the transport groups at the Great Step, despite all good resolutions to the contrary.

This unsolved problem of how to overcome the difficulties of supply across the Great Step will therefore, on each new expedition to the giant mountains of Asia, endanger all the usual good intentions of a clear division between transport and summit parties, until the matter is enlivened by new ideas and furthered by fresh and unexhausted methods. But everything new meets at the beginning with at least a frown, which often changes very quickly into the obstinate idea: *On y passe pas!* Even the suggestion of overcoming the difficulties of the Great Step by air—which one of our technical age might well propose in a naive and spontaneous way—would probably meet, apart from a condescending smile, at most with a repetition of that famous comment with which Frank Smythe 25 years ago resisted the presumption of an eager innovator who made light of the advice of Smythe's models, General Bruce and Colonel Strutt: "It is over the graves of former mistakes, and not on the wings of new ideas, that the greatest Himalayan peaks will be conquered."

Dream-flight

We are indeed warned—all of us. We should not get entangled in Gustav Hasler's confident maxim: *hoc erat in votis*, should not through our wish-dream forget that a mountaineering tradition entitles the warners to sit back and raise an admonitory finger against dallying with revolutionary ideas. These meandering thoughts follow their tortuous course; for Greek mythology, as far back as Ovid, wells up in a full stream of hexameters, to pour into our ready ears this song of praise, the ancient wish-dream of man to conquer space and gravity:

Daedalus sits pondering how to escape from the captivity of Minos, King of Crete, how to leave behind the monstrous bull-headed Minotaur of the labyrinth. The plumage of the birds gives him the idea. Under his skilful artist's hands, down and pinions arrange themselves into artificial wings; he binds them in the middle with thread and fixes the quills with soft wax, until his work shows sufficient roundness to hold the air and with its double wing to support the body suspended below. He places the wings about the shoulders of his son Icarus, slips into his own harness and together they glide through space, the father first, followed, as he had taught him, by his son:

*Hos aliquis tremula dum captat barundine pisces
Aut pastor baculo stivare innixus arator
Vidit et obstipuit quique aethera carpere possent
Credidit esse deos...*

(And some, while the line jerks in the captured fish, or the shepherd leans upon his crook, or the peasant at the handle of his plough, watch and are amazed, thinking that those who thus can cleave the air must be gods.)

But they are not immortals and false gods are speedily punished: beyond the Sporades, the plumage carries the youth, intoxicated with flight, near to the sun-chariot; the wax melts and the wind of his falling tears the down and the feathers apart. In vain the boy beats the air with his arms. Icarus falls from his dream-flight deep into the waters of the Aegean.

There is of course a good deal of flying in the myths and legends of classical antiquity, and often more successful than in the macabre tragedy of Icarus. How gloriously does Zeus sweep through the air as an eagle with the captured Gany-mede; how swiftly rushes the prying Eros, the loveable original of the sweet baroque putti, or the clever Hermes who immerses man in dreams whenever he takes it into his head to slip on his winged sandals. If flying was thus a prerogative of the immortals, was it not left to us to dream?—to brood and wonder as we peer from the wind-break at the gliding clouds or take delight in the resourceful play of the choughs?

We have long realised that the turbulence created by a mountain slope becomes evident when a bird, flying in across it, is suddenly forced up, undergoes an accelerated lift that throws him high up above the ridge into the roaring sky, only to renew his game just as suddenly when, with tightly closed wings, he shoots straight down to earth like a stone thrown into an eddy, then with a joyful caper swings again into the blast and is blown away.

Do we need a more conspicuous pointer for our awakened desires? What can all warnings be to us, when some great steep ridge, on a chaotic glacier fault or a boulder-strewn mountain flank, so manifestly cries out for the employment of a new and bold means of transport, as does the Great Step between Base Camp and Advanced Base on a giant Asiatic mountain? On K 2 it is revealed on a cyclopean scale: out of the bed of the Godwin Austin Glacier the Abruzzi Spur sweeps steeply upwards and splits into ribs in one tremendous flight of over 6000 ft. to the curve of the shoulder. Frequently ascended and secured by fixed ropes from bottom to top, the Abruzzi Spur has become the usual route from the glacier to the shoulder of the mountain; even its length was already well known, and the difficulties and dangers of each individual section, and it was known where to pitch the six transit camps on the ridge.

In 1953, in Camp I, the Americans had one-ton loads ready, which were to be carried up to the shoulder by the transport groups, so that Camp VII was in a position to spare two hundredweights (food and equipment for eight men for two weeks) for Camp VIII. Under predominantly unfavourable weather conditions the Americans carried these loads up to the shoulder in five weeks.

With the Italians in 1954 the supply dump at Camp I amounted to a ton and a half, and Camp VII was to be put in a position to give Camp VIII, first, six hundredweights of this (supplies for five men for one week) and then, for a second advance, half a ton (supplies for five men for two weeks). Hindered by forty days of bad weather, the Italians carried their loads up to the shoulder in 55 days.

A stumpy light plane, specially built for the task, would be able to lift a load of half a ton from the flat glacier up to the shoulder in a single flight; it could carry out this flight during chosen calm weather and make the trip to the shoulder several times if required.

Is this still a wish-dream?—or already the demand of a new age, a new age bent on moulding the style of its undertakings upon the valid signs of the times, and certainly not according to conceptions which were established 50, 70, or 100 years ago. For this is the unmistakable characteristic of the day; one does not wish to cling to the things of yesterday longer than reason requires. Certainly a tradition may well keep certain methods current, may counterbalance certain tendencies, or, out of affection, piety or respect, effect a check on sober reason, so long as no cogent reason calls for the application of cold logic.

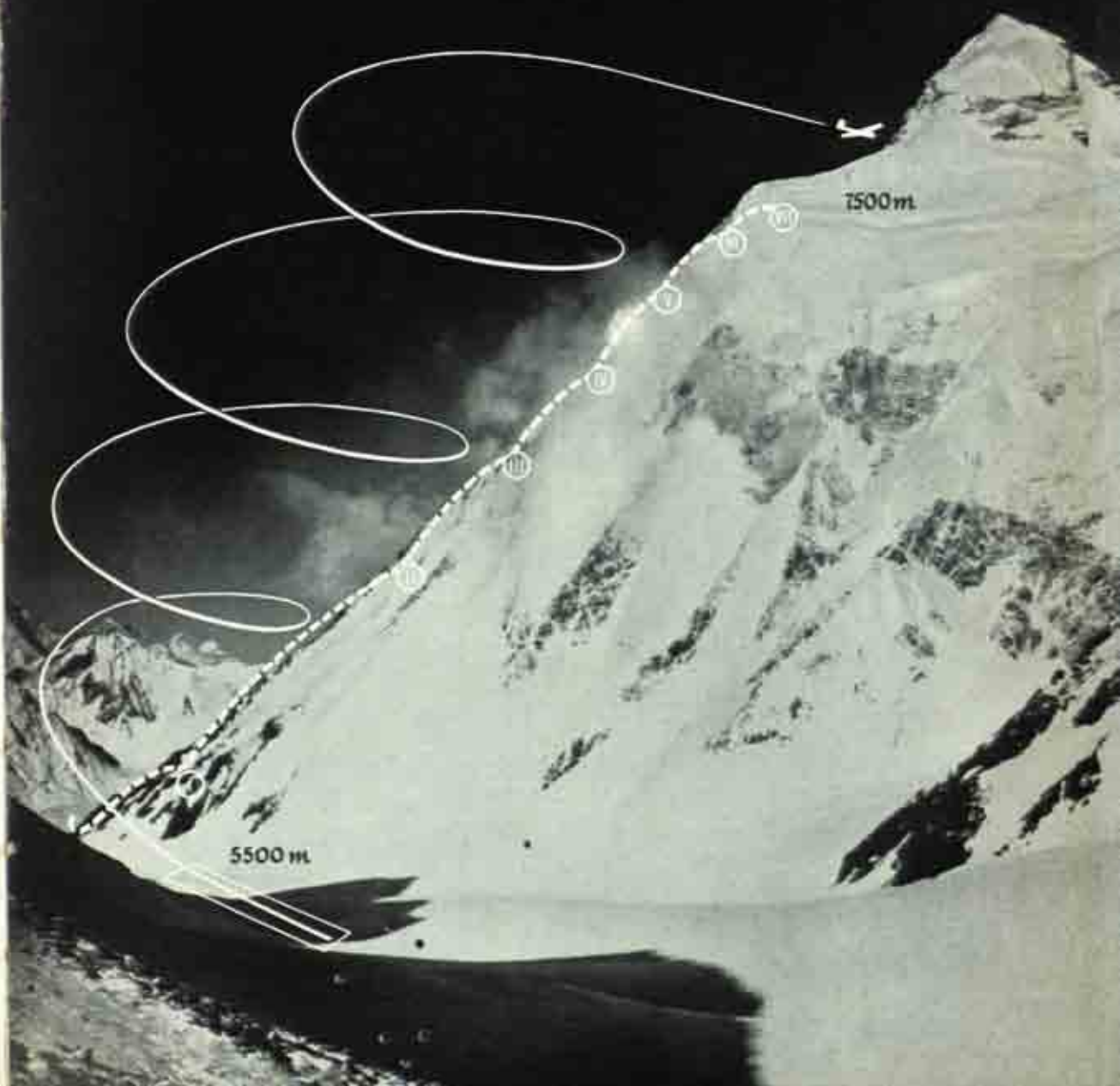
Are we therefore to forego the development of flying as a branch of expeditionary technique specialising in overcoming time and distance, because the reverence of our generation for a tradition created by our fathers is stronger than many suspected?

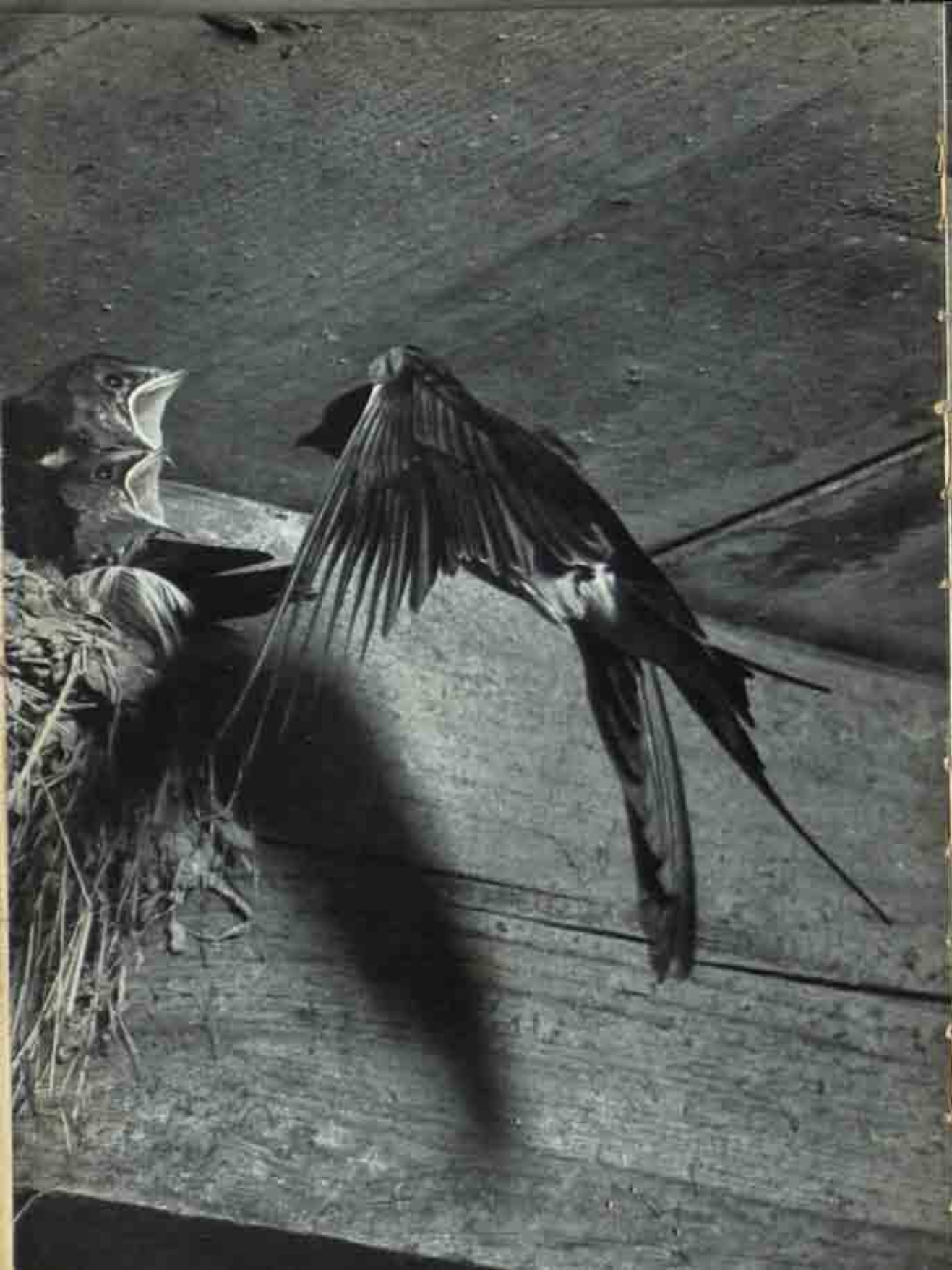
Limitations

The airmen did not wait for the arrival of atomic energy to begin in earnest the conquest of the air. Dufaure and Udet demonstrated on Mont Blanc what the wretched crates of those days were capable of; since then, in this age of light metal alloys, usable or even surprisingly efficient small transport plans have been developed in mass production. Dozens of pilots have flown in such types in recent years in the Canadian and Danish Arctic under conditions which often demanded a supreme effort by both man and machine. As their representative, Maurice King should not be forgotten. Following his successes with the Snow

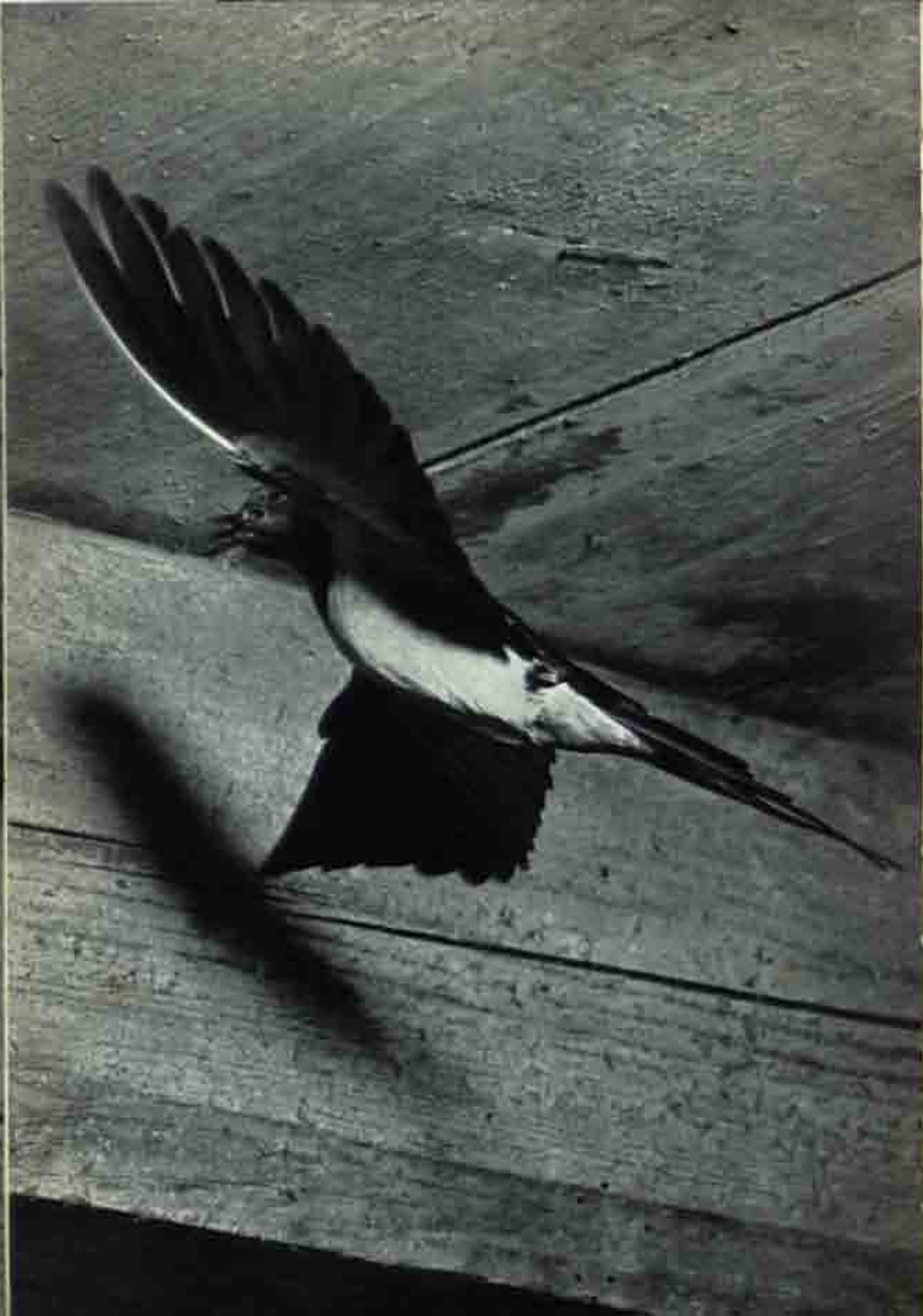
Plate 15: View of K 2 (8611 m) from Skjung La (6253 m) above the uppermost firm of the Godwin Austen Glacier. Against the sky, between the glacier valley and the "shoulder", the Abruzzi Spur outlines the Great Step, across which each man-load had to pass, through six transit camps, to reach Upper Base VII and thus be available for use in the high camps. "Hoc erat in votis" is in English translation: This accords with my desires. The idea of a midget plane on the mountain giant arises from the great size of this particular transport task; it refers not only to K 2, but principally to the idea of transport flight as part of a possible development of expeditionary technique.

HOC ERAT IN VOTIS (HORAZ)









Cornice Expedition in Yukon he was taken on by Colonel P.D. Baird for the Baffin Island Expedition of 1930 and flew his "Norseman" from Montreal to the Clyde Fiord; as an adaptable and reliable master of take-off and landing with skis and floats his personality is still strong in the minds of his companions of the expedition, who in the following year had to deplore his tragic death as a sacrifice to his profession.

The "Norseman" type was built for use with big radius of action, especially for the Arctic. The Piper Super Cub, with which in the Spring of 1932 the "glacier airman" Hermann Geiger landed for the first time at 8500 ft. on the Kanderfirn without a prepared strip, was only fully usable after retractable skis had subsequently been fitted to the under-carriage. In the hands of its extremely talented pilot this aeroplane thenceforward displayed an activity that was as industrious as it was beneficial; year in, year out, the Piper has been in active service as transport plane, ambulance, or taxi. With it Hermann Geiger examined the flying conditions on so many névés in the western Alps that eventually hundreds of "air fields" in the high mountains were at his disposal. Continuous practice in judging such varied landing and take-off possibilities had the result that such flights were made with unprecedented safety and with the accuracy of an airline pilot.

With an admirable capacity for observing nature, Geiger succeeded in recording the actual *technique of the chough's flight*, so that the method and preparation of landing upwards could actually be utilized for the training of further pilots. The beginning of this broad development will no doubt contribute to the fact that within a few years the use of the aeroplane for passenger and goods traffic in the Alps will be as commonplace as the employment of motor vehicles on the network of Alpine roads is to-day.

Four electronic-flash photographs at an exposure of $\frac{1}{1000}$ sec. from about 6 ft.: swallow (*hirundo rustica*) approaching and during the "fixed-spot landing" at the nest. The added arabic figures (1-4) refer to the corresponding aeronautic remarks on page 74.

Plate 16: (4) - After wrongly judged or disturbed approach the swallow seeks to nullify her transformed impetus: the spread primaries (braking flaps) produce a turbulence, whereas simultaneously the increased curvature of the wings seeks to preserve sufficient lift for ballistic procedure during the fixed-spot landing.

Double-plate 17/18: (3) - Masterly spot landing: The movement still maintains a bit of the lift, so as to be able to touch down accurately at the nest's edge with completely nullified impetus—worm in target!

Plate 19: (2) - At the end of the approach, straightening up into braking position to nullify the impetus and stretching the feet forward for the fixed-spot landing. The grazing of the left primary against the wooden ceiling is one of the possible disturbances which lead to a sharp reaction during accurate procedure at the spot-landing, as shown by plate 16, the instinctive release of a correction in such a position is remarkable—an airplane could scarcely equal it.

Plate 20: (1) - In the approach, the swallow still has the speed and sufficient lift to pass at the required height into a fixed-spot landing.

To delight the research worker and mountaineer with some peculiarities of bird flight and their translation into the world of aeronautics, let us now turn our attention to the four accompanying electronic-flash photographs illustrating the secretive doings of the common swallow. It should be noticed that the plates 20 (1) - 19 (2) - 17/18 (3), in the book from back to front, amount to a sequence which follows with great impressiveness the serious business of feeding. First of all, in order to protect the eggs and later the young, the swallow has made its nest in a hiding-place difficult to find; cat and rat should hardly be able to reach the nest, and for flying burglars there is little temptation to challenge fate in the twilight of a stable, close under the roof timbers. Even for the knowing swallow herself to reach her nest presents each time a difficult task of flying, for the mastery of which the bird seems to have developed, by frequent repetition, an appropriate *fixed-spot landing technique*.

To facilitate the aeronautical interpretation of bird flight by means of phase sketches, bracketed key figures have been added to each plate number; the sketches 1-2-3 correspond exactly with the phases on plates 20-19-17/18, so that the events during *one* fixed-spot landing by the swallow can be followed without a break.

Phase 1 (plate 20): In the approach the swallow still has the speed and sufficient lift to pass at the required height into the fixed-spot landing. The corresponding sketch (1) shows the robust light plane during approach.

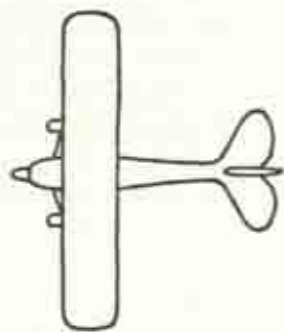
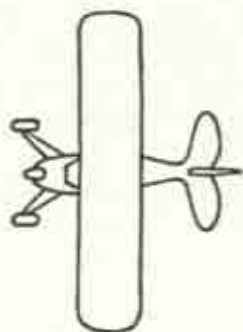
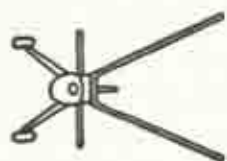
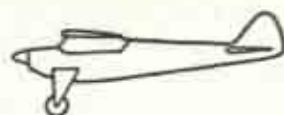
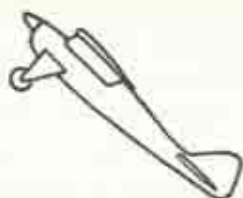
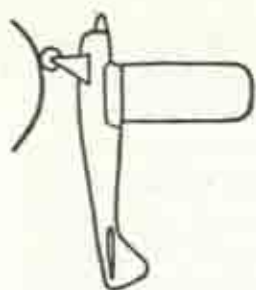
Phase 2 (plate 19): At the end of the approach, rising into braking position to nullify the impetus and stretching the feet forward for a fixed-spot landing; spreading the primaries (the left one is touching). The sketch (2) shows: the wings have been broadened (Fowler flaps); the angle of attack is increased.

Phase 3 (double-plate 17/18): The movement still preserves a bit of lift, so as to be able to touch down accurately at the nest's edge with completely nullified impetus—worm in target! The sketch (3) shows: the plane bounds against the vertical landing space and will crash immediately; the wings are tipped up.

But not every approach results in a technically faultless landing, so the bird has been given an instinct that enables it, when disturbed, to correct itself as revealed by the electronic-flash photo (plate 16) and interpreted by the corresponding aeronautical sketch (4).

Phase 4 (plate 16): After wrongly judged or disturbed approach (plate 19, e. g.) the swallow seeks to nullify her transformed impetus: the spread primaries (braking flaps) produce a turbulence, whereas simultaneously the increased curvature of the wings seeks to preserve sufficient lift for accurate procedure during the fixed-spot landing. The sketch (4) shows: the angle of attack has been even further increased; the tips of the wings have been set into a vertical position to increase the resistance of the plane.

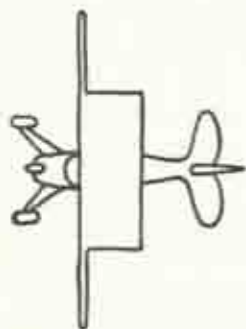
Thus the "Operation Swallow" can be regarded without doubt as finished. On paper, the robust light plane has faithfully imitated the flight of a bird, but



3

2

1



4

has not fared any better than the artificial wings of Icarus: it is still impossible for the machine to imitate the fixed-spot landing of the swallow, i. e. to approach accurately any given point with completely nullified velocity of approach and, so to speak, to moor there, defying gravity. So a fixed-spot landing in the high mountains is only possible where the terrain allows a landing-run for the skis, i. e. a subsequent nullifying of velocity. Hermann Geiger has shortened this landing-run considerably by an upward-directed landing. It was now the turn of the helicopter to prove its utility in the Alps.

Igor I. Sikorsky has voiced the startling pronouncement that our planet is really too small to need anything faster than what flies at about 500 miles per hour. Sikorsky's words are of great significance in the field of aeroplane construction: he was responsible for the wide development of the helicopter in peace and war. During the avalanche emergency in the Alps the helicopters became quickly familiar. In February 1955 a Hiller helicopter on emergency service with Zermatt carried 90 tourists and about 6½ tons of luggage. On transport to the snow-blocked Gotthard Hospiz, 10½ tons of oil, machine parts, materials, tools, food and personal were taken up from Ambri-Piotta by a Bell 479 light helicopter; each of the 46 sortees flown carried an average load of 470 lbs. up 4260 ft. in 17 minutes. Föhn gusts at -15° C. hindered the flights, yet the transport operation was carried out at less cost than would have been the case even on a snow-free road. In March 1955 the Hiller helicopter landed on the ice calotte of the Jungfrauoch (11,500 ft.) and a two-seater Djin jet helicopter (proto-type) even touched down on the peak of the Monch (13,450 ft.). Finally, in June 1955 a French pilot, flying a Bell helicopter, succeeded in landing on the top of Mont Blanc (15,771 ft.).

These helicopter achievements have proved that technical science is far on the way to overcoming the disadvantage of the method of the chough's flight (with run out) and is getting gratifyingly near to the fixed-spot landing of the common swallow. Unfortunately, we must not forget that in the Alps landings with run out, as well as fixed-spot landings with nullified velocity, are not possible at a height of more than 15,771 ft. (Mont Blanc); moreover, at this level is the zone where cloud caps sit on the summits—the same height where, across the seas, at the foot of the giant mountains of Asia, the porter-caravans struggle towards the glacier basins in which the Base Camps of our expeditions are established.

It should not be forgotten also that a further, inexorable limit of performance restricts the use of piston-engined planes, due to the diminishing pressure of the air with growing altitude. Man, in spite of getting used to heights (acclimatisation and training) reaches the limits of his capacity in the region of about 21,000 to 23,000 ft., according to the constitution of the individual climber, and depends upon supplementing his air intake with oxygen. In a similar way, the piston engine's performance decreases because the rarefied air makes a sufficient compression of the gas mixture impossible. In judging the suitability of a machine in respect of altitude, one speaks of the "ceiling" which it can reach without failing in its task. For the few light planes the critical limit is already reached at 16,500 to 19,500 ft., and the higher a load has to be flown above this level, the quicker the climbing capacity drops. For a transport flight across the Great Step of a giant mountain, say from 18,000 ft. to 23,000 ft., the piston engine is quite out of the question; it also lacks, even under most favourable conditions, the safety margin which the pilot needs to touch down like a chough, with skis slanted

upward in the firm, and, in running out with open throttle, to pull up his machine in a favourable position for starting the return flight. A weightless helicopter touch down at this height would be out of the question anyway.

Developments

Nature has thus put up a frontier in the air for the performance of a piston-engined plane. The world of aeronautical ideas of our elder generation cannot repeat the tried remedy of improved performance ad infinitum: with continuously increasing altitude, the air itself is affected and finally, passing out of the troposphere into the stratosphere, there just does not exist anything which could be compressed in an internal combustion engine of conventional stroke. In the news section of our daily papers we do, of course, often see some rather incoherently reported items about surprising technical innovations, without, however, realising that unceasing work is quietly going on to overcome these troublesome limitations.

Technical science to-day is in a phase of consolidation: during the Second World War and ten years of cold war and consequent armament race, revolutionary ideas have sprung up like cyclones. These truly remarkable ideas must now be freed from their tragic entanglement with armament engineering and nature must be returned to the people of the earth as its servant. Undoubtedly, the mastery of atomic energy will make revolutionary progress in the field of power generation possible. But already the transition from piston engined motor to jet engine reveals at present such surprising possibilities that a rearrangement of our thoughts into present and future phases of development is unavoidable for grappling with the ancient wish-dream of man.

If we try to bring together in the first phase of development what is being done to overcome especially the dependence upon long run-ways for take-off and landing, we come at once upon the most important problem of the vertical start. By this the aircraft could be brought into flying position and started, so to speak, "above ground"; conversely, landing brakes would be necessary to transform the flight "above ground" into a vertical landing. This would amount to the performance of the helicopter without being restricted by its disadvantages: the fixed-spot landing of the common swallow would at once be completely solved for every terrain and height, because the piston-engine could be replaced by the jet engine.

For ten years Rolls-Royce have worked on the development of the vertical take-off. The "flying bedstead", as shown by news-reels and illustrated papers, is at present still a prototype of $3\frac{1}{2}$ tons weight, powered by two gas-turbines. In

about fifteen years Rolls-Royce hope to complete this development for use in the field of civil-aircraft construction; for years to come the construction of warplanes still has priority.

The second phase of development might well one day reveal the startling universal utility of the "flying saucer", a gyro-plane with jet engine, working on most rational lines, which will become popular when its time comes. Perhaps the step from the helicopter to the flying saucer has already been taken: at any rate, the jet-helicopter has become a reality, and it is possible that the flying saucers, observed in recent years and interpreted as interplanetary space-ships, are very real but secret types of a well-camouflaged airforce, serving the earthly God Mars. A jet-helicopter like this would be by no means a saucer, but the rotation of the gyro-plane would appear to the eye as a solid body—just as we see the propeller-like seedling of a maple, blown away by the wind, drifting along like a small flickering saucer, because our slow eyes are deceived. Thus, the gyro-plane too will consist of a rotating central body to which are fixed, like warts, wing stumps and jet-engines to act as adjustable steering and lifting mechanism. Instead of heavy engines or gas-turbines, with this revolutionary type of aircraft everything will be light, very simple and cheap; the pipe-like combustion chamber receives its air-charge through the rotary compressor; the quicker the thing rotates the better its performance; the cheapest oil will replace pure aircraft fuel because the jet-pipe is so simple by comparison with a gas-turbine that sooting-up is of no consequence. And as a result of the continuous high-speed rotation, the adjustable angle of incidence of the wing stumps, together with the directability of the jets, will conjure up a latency of climbing capacity of a *never* suspected intensity, so that the gyro-plane promises to become like a reined-in horse—a symbol of preparedness.

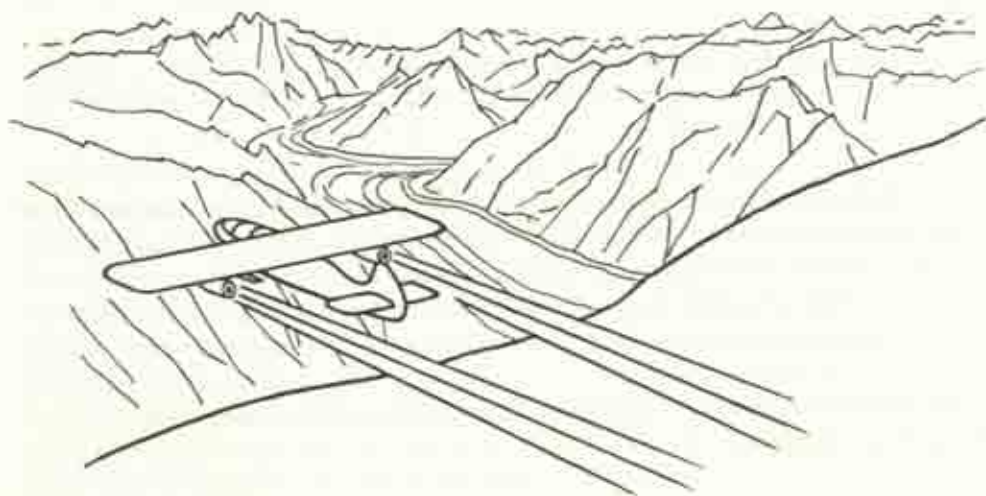
But when shall we be able to let *our* flying saucers spin up in front of the Great Step? Just think for a moment. Any national industry can put the gyro-plane on the market tomorrow as a toy, and on the day after it can be handed over to mankind from a conveyor belt as a jeep of the air. Why, then, has this not happened long ago? We do not know, and remain under the delusion that we are spied upon from another planet. At the same time, we are afraid soon to hear again the wail of the air-raid sirens.

Thus the development phases of the very near future are already bursting with problems. We cannot deal with them within this sketchy survey. Even were we to assume that to-day all technical conditions could be solved to counter by a prolongation of the air transport route to the Base Camp, the over-valuation of the porter column, we do not want to conclude this study without making a suggestion as to how to overcome the Great Step. While the use of a small and

robust transport plane, with under-carriage or skis as required, appears obvious to-day for transport flights with low ceiling, it is just as easy to imagine an improvement in the performance of special machines with sufficient ceiling by using *starting rockets*, and to use these at the Great Step. At least the chough-like form of flight could be used in this way at altitudes which are prohibitive to existing small transport planes.

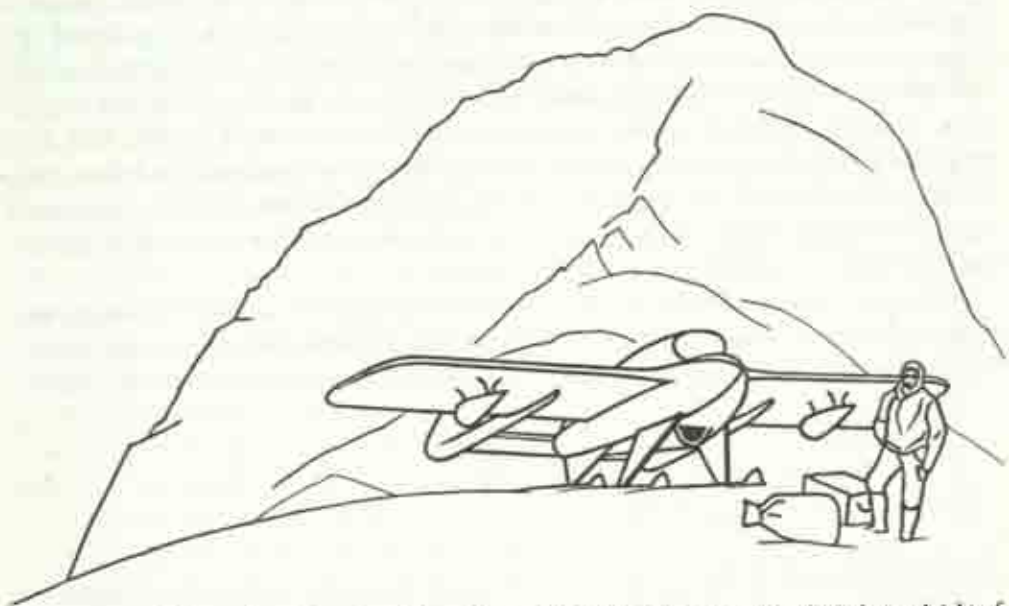
In take-off conditions with a sufficiently long runway on the firm, a piston-engined single-seater with powerful radial motor could achieve a towing-speed of about 90 to 110 m.p.h. and release a transport glider with a disposable load of half a ton at a sufficient height to enable it to carry out a landing above the Great Step. Such a transport glider would have to be constructed lightly and be provided with big wings and efficient landing flaps. Two small rockets below the wings, with a duration of about one minute, would enable the glider to rise at the start of the return flight. It hardly needs to be emphasized that this method could only be used by a master of chough-like flight.

But it is also conceivable to equip a small jet plane with a double-fuselage so that it can take a central gondola with jet-engine, cock-pit and cargo space, with big wings and efficient landing brakes, the start taking place from the firm strip



The transport glider starts with the aid of its rockets after having been discharged its load.

with a bird-like landing above the Great Step. Here, further rockets, supporting the take-off, must be provided; in that way the return flight, either with the remaining fuel or by gliding, would be without risk.



The small, large-winged transport plane has, with the help of its jet-engine, climbed to a height of about 24,500 ft., has landed on the firm and discharged its load. The two rockets visible beneath the wings will enable it to start at this height.

All these thoughts and suggestions have only one purpose: by a development of transport technique to check the accumulation of masses of people on the caravan routes to the mountains and the industrialization of the profession of porter and high-mountain porter. The more familiar the constructive brains of aircraft engineers become with our transport problems, the sooner it will be possible for the technical considerations to mature which, sooner or later, can give us the modern equipment for pushing forward the exploration and surveying of the giant mountains.

CHO OYU

By Herbert Tichy

In December 1953 I was sitting with four Sherpas beside a camp fire in the westernmost part of Nepal. We were all rather melancholy because a unique journey of great beauty lay behind us: in four months we had crossed the whole of West Nepal from Kathmandu to the Indian frontier and made the first ascent of three mountains of over 6000 and two of over 5000 m. This wonderful time had now come to an end and we were all sad.

"Come again", said Pasang Dawa Lama, the Sirdar of my little party; "I know a very high mountain which we can do together."

Pasang, together with Tenzing Norgay and Ang Tharke, is one of the really great Sherpas and I listened carefully to what he had to tell me about the "very high mountain".

It was Cho Oyu that he meant, 26,750 ft., and out of the nostalgic talk a plan emerged. Scarcely ten months later Pasang, Sepp Jöchler the Tyrolese climber, and I stood on the summit of Cho Oyu. A distant longing had become fact.

To make the following report of the first ascent of Cho Oyu more comprehensible I must mention—without wishing to push myself into the foreground—my own attitude towards the Himalayas and my past experience of the mountains.

I had the good fortune, while still a student of 23 years, to cut right across the Himalayas to Tibet and reach the Gurla Mandhata, 25,355 ft. high, disguised as an Indian and accompanied only by a Sherpa and an Indian student.

Shortly after the end of the war I lived for months like a native in lamaistic monasteries of the Sino-Tibetan frontier regions. For many weeks in 1951 I shared the solitary life of the hermits and holy men of the Himalayas. In 1953 I crossed West-Nepal. The Himalayas and their people had become for me not a *second home* but simply *home*.

Expeditions planned on a grand scale seemed to me a disturbing intrusion into a land of harmony and the will of the gods. Although not a crack mountaineer, I wanted to try and see if one of the high summits could be reached with more limited resources.

My preparations were inspired by such ideas. I wanted to take with me only two Europeans; their technical abilities interested me less than their human qualities.

I was lucky enough to find in the engineer, Sepp Jöchler, and Dr. Helmut Heuberger, both from the Tyrol, two companions who fell in completely with the intended style of the expedition, and who were on terms of such sincere friendship with the Sherpas and myself that our relationship one with another almost surpassed our joy at reaching the summit.

During our expedition we had bad luck and good luck. If a fierce hurricane at the beginning of October had not destroyed our tents at a height of 23,000 ft. Pasang and I would probably have reached the summit the next day and the entire group could have turned to a new goal—what I had in mind was another eight-thousander—for our energies were not yet exhausted.

Fate willed things differently. I came back from Camp IV with frostbitten hands. But two weeks later, on the day we reached the summit, we were lucky. The annihilating strength of the autumn hurricane had subsided to a mere gale, which hindered us but did not drive us back.

On our return from the summit there was great rejoicing in the Sherpa villages, with much alcohol and emotion. Pasang called us "Father and Mother of the Sherpas". Priests blessed us and prayed lengthily over Cho Oyu, the Barda Sirdar and the Austrian party.

It might all be regarded as a pleasant but unimportant episode; yet I believe our attitude was the foundation of our success. When we said farewell to our Sherpas and porters at the airport of Kathmandu, these hardened men, to whom death is the constant companion of their profession, had tears in their eyes and they embraced us again and again.

Of course, I do not want to give the impression that an emotional basis makes the technical equipment a matter of secondary importance.

So far as our limited means allowed, our equipment was first rate and in accordance with the most up-to-date experience of the Himalayas, but we did not allow ourselves any luxuries. We had to save money, space and weight. The six Sherpas who were to take part in the attack on the summit were dressed exactly like ourselves—there was no difference in the equipment of Sahibs and Sherpas.

I believe that the equipment of many expeditions can be considerably reduced if one lives after the manner of the country. During our march from Kathmandu to Namche Bazar, which lasted almost three weeks, of our provisions we used only one tin of Nescafé, two tins of jam and one tin of butter. But this was pure luxury and we could have managed just as well without these items; in fact we lived very well off the land. Two days before we reached Namche, Helmut read us a copy of the report in which the doctor accompanying the Swiss Everest expedition of 1952 set forth his general medical advice. We noticed with much surprise that we had nearly always done exactly the opposite of what was recommended. Our staple food had been native bread (*Chapattis*); we had been hearty

drinkers of *Chang* (a kind of beer); we had not avoided contact with natives from fear of infectious diseases and malaria, and had completely forgotten the necessary preventive measures, in spite of our ample medical supplies. But we were all in a very good state of health.

This may have been simply a matter of luck, but I do not really think so. Ours was an "adaptation" rather than an intrusion, and we "achieved harmony" rather than conquered.

Should my hands permit me to make another expedition into the Himalayas, then Helmut and Sepp, Pasang, Ajiba, Ang Nyima, Gyaltsen and our other Sherpa friends will be with me, and we shall again forget the experience and rules of the big expeditions and wander among the mountains and climb them in our own way. It may not be granted us to reach one of the "very high summits" again, but I know for certain that we and the Sherpas will again have tears in our eyes when we say farewell.

About our goal, Cho Oyu, we knew very little. Pasang, who had seen the mountain, said: "It is an easy summit, easy to do." I valued his judgement and was convinced that we would encounter no unsurmountable difficulties. On the other hand, the British Cho Oyu expedition of 1952 under Eric Shipton had been stopped by a difficult ice barrier and Shipton reckoned that it would take two weeks to get through. I wrote to Shipton, whose preference for very small expeditions and personal involvement I very much admire, and asked him whether he thought that an expedition of only three or four Europeans with a corresponding number of Sherpas would have much chance on Cho Oyu. Shipton replied that he considered such a group to be quite adequate. He also wrote that he thought the period after the monsoon was a very favourable one for this mountain.

In the late Autumn of the previous year I had myself found—even in December—ideal conditions in western Nepal: a sky that was nearly always cloudless, winds that were bearable and temperatures that could still be endured. For instance, we reached the foot of the yet unclimbed seven-thousander Saipal only in mid-December. If the flank which the mountain presented to us had not been so difficult and our provisions not so scarce, I believe that even at this late season of the year we would have had a chance of success. I am therefore a supporter of late mountain expeditions to the Himalayas and planned the attempt on Cho Oyu for October.

I must admit that my ideas regarding Cho Oyu were too optimistic. The autumn gales in East Nepal are apparently much more devastating than in the West (or perhaps it was just by chance that in 1953 I experienced particularly favourable conditions). Our great enemy was the gale which, in a mostly cloudless sky, raged across the summit and drove before it plumes of snow hundreds of yards in length. Nevertheless, this fierce hurricane was at the same time our

best friend—blowing away the deep snow of the monsoon and preparing for us an almost ice-hard layer in which our crampons left hardly a trace. During our first advance to Camp IV (c. 23,000 ft.) we waded up to our knees in deep soft snow. Two weeks later, on October 19th, when we reached the summit, the mountain offered ideal conditions—hard snow, compressed by the wind, in which our crampons found excellent support. The expedition under Raymond Lambert, attempting the mountain in the days that followed, probably had the same good snow conditions, but the gale had by then become so fierce that they had to turn back at about 25,000 ft. It is therefore my opinion that if one intends to make a dash for one of the high Himalayan summits, the Autumn perhaps offers, if it is kind, a few perfect days without danger of avalanche, free from heavy snow and winds that are still bearable. Compared with Shipton, who tried Cho Oyu in spring, we found many advantages and some disadvantages. I personally would prefer the period after the monsoon.

What follows is a short report of our enterprise.

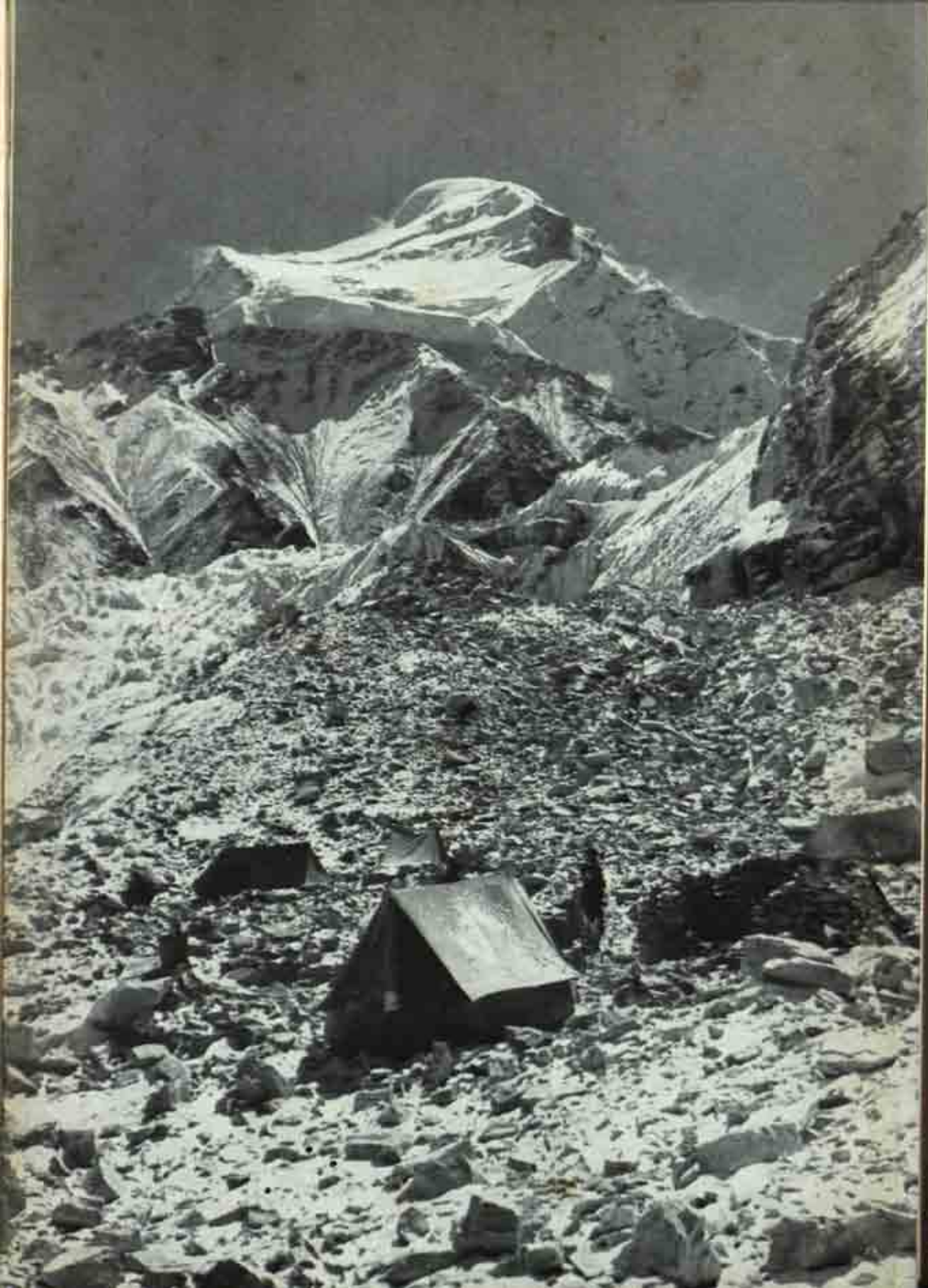
On September 2nd, 1954, we set off from Kathmandu. We had landed in Bombay with less than a ton of baggage and in Delhi bought another hundred-weight of very varied tinned food; from Austria we had brought only some packets of soup powder, tinned milk and Nescafé. At Kathmandu we completed our provisions with flour, sugar, tea, rice and onions. With 45 coolies and 11 Sherpas we started off. Our supply of silver coins (paper money is not accepted in the interior of Nepal) alone accounted for six loads.

We followed the route that is usual for Everest and on September 19th reached Namche Bazar, where the four Indian officers of the Nepalese military post warmly received us and as far as they were able helped us with our further preparations. We changed our porters, left about half our supplies at Namche, in order to make ourselves more mobile (also so as not to have to pay porters' wages unnecessarily should Cho Oyu prove impossible and force us to turn back) and followed Shipton's route to the Nangpa La. Jöchler, Gyaltsen—a native guide who knew the pass—and I had gone ahead to find a suitable site for Base Camp. From the summit of the Nangpa La, marked by prayer flags, we turned eastwards into a side valley—and for the first time Cho Oyu rose before us in all its greatness and beauty.

Plate 21: In a small side valley east of the Nangpa La, a camp site at about 18,000 ft. gives a first clear view of the western side of Cho Oyu, 26,770 ft.

Plate 22: On the west ridge of Cho Oyu, above Camp II (20,340 ft.). Further on this ridge runs up to the ice-barrier which leads into the steep but open west flank of the mountain.

Double plate 23/24: View south from Camp II (20,340 ft.) on the western ridge of Cho Oyu. Right, under a plume of cloud, the only named seventhouzander in the immediate neighbourhood of Cho Oyu, 26,710 ft.









We began to study the mountain and its possibilities. We wished to follow Shipton's route, since we considered it the best. Our first intention had been to split up for a while, advance across a glacier to the north of Cho Oyu and explore the northern flank before starting a serious attack. But we subsequently preferred not to break up a party that was small anyway, so together we concentrated on the western flank of the mountain. It was impossible to discover from Base Camp (c. 18,000 ft.) a practicable route of ascent: ice ridges which appeared to run together we later found were separated by valleys hundreds of yards wide. To settle a route from such a great distance was bound to remain wishful thinking and to be changed by facts. We had to decide our way, camp to camp.

We pitched Camp I on a moraine at a height of 19,000 ft.; Shipton must have camped there too, for we found a few rusty food tins. Thence we advanced across a steep slope of scree to Camp II, at 20,350 ft. on the west ridge, which branched off like a V below the Camp. Camp III was established at the uppermost end of the west ridge, just below the ice barrier which forms the transition to the steep but open west flank of Cho Oyu. We reached this spot at 21,650 ft. after bad weather and the making of a track on the ridge had delayed us for two days.

Helmut supervised supplies from Base Camp. Sepp, who still had difficulty with the great height, had descended from Camp II to Camp I, and I reached Camp III alone with the Sherpas.

Here once again I had to admire Pasang and Ajiba. We had many hours of strenuous effort behind us when we found the camping site a three o'clock. I should have liked some tea and a rest; but the barrier towered before us and Pasang would not rest until he knew whether or not our route would end here.

I was still panting from the toil of a long ascent when he fetched ropes, ice and rock pitons, which he hung about himself and Ajiba and looked at me inquiringly. I could have postponed the reconnaissance until the next day, or I could have let these two go by themselves; that would have been only fair and reasonable and wise, but I roped up without a word and knew that this was the only proper thing to do.

It was good to be together again on one rope with Pasang and Ajiba, those two old friends. Before us the ice rose almost vertically for 300 ft. Could we master this pitch? Above all, what would we find higher up? Pasang went first, each movement assured and experienced. Slowly the rope slipped through my hands. Below me stood the silent Ajiba. Pasang followed one of the deep-cut

Double plate 25/26: Camp III (21,650 ft.) on the west ridge of Cho Oyu, close under the ice-barrier. View north-west to the Nepalese-Tibetan frontier mountains north of the Nangpa La, with the huge Cho Raupang (21,064 ft.) thrusting through the clouds.

crevasses, in the hope that it offered a way through. He disappeared into the darkness of the hole, the rope moved only by inches. Below us the tents were put up; Camp III lay like a toy far below and our trail led like a thin thread across the virgin snow. Would it end here? Would it ever reach the summit?

A call from Pasang interrupted my thoughts: "No way."

He crossed the steep ice slope to the left and then fought his way upwards. "Like at Jagdula" he gasped down to me. There we had mastered a similar slope about a year ago.

Again Pasang disappeared, then he called to us to follow. The steep ice sloped back and we stood on a flat patch. Ajiba too had reached us. Here the breach no longer looked impassable, but we could not be certain yet. In another ten minutes of concentrated effort, we knew that the way was open before us.

I could hardly take it in: we had mastered the great problem in scarcely an hour. Perhaps, most luckily, we had attacked at the only possible spot; perhaps this breach had changed since Shipton's attempt. But we had never dared to hope to get through so easily and with so little trouble.

We fixed some ropes to make the difficult part of the pitch passable for the next day. Whilst Pasang and Ajiba put the finishing touches to the job, I returned to Camp. The Sherpas ran up to meet me and excitedly asked: "Is there a way?" I nodded happily. I was dead tired; they pulled the crampons from my boots and thrust a bowl of hot tea into my hands. I photographed our track as it rose victoriously skywards, where Pasang and Ajiba, small as ants, were still at work. I did not then know that this was to be the last shot I would take for many weeks, that two days later I would stagger past this Camp with frozen hands, driven on only by the desire for warmth and life.

The night was pleasant and calm. In spite of the height I slept excellently. Gratitude and astonishment filled me. If we maintained a fast pace the next day we could reach 23,000 or even 23,500 ft. Our supplies, tents and Sherpas were enough. And the day after that Pasang and I could make the first attempt on the summit.

It was a cloudless morning once more; the wind and temperature were bearable. The steep pitch, which was still in the shadow, was not pleasant, but we came out again into the sun and fought our way upwards. The snow was crusted by the wind and brittle: we sank in deeply and made height slowly, but we made height nevertheless. It was a continuous fight for breath, but I was not alone in my difficulties; the Sherpas felt the same way, but then they were carrying heavier loads.

At 4 o'clock we pitched the tents at not quite 23,000 ft. Two Sherpas went back to Camp III. Pasang, Ajiba and Ang Nyima stayed with me. The evening was not as comfortable as the last; an icy cold wind was blowing, driving dense

clouds of snow dust before it. But I told myself that this is probably what evenings at 23,000 ft. are like anyway and that there was no reason to worry.

Sipping the hot soup in our tents we made plans for the next day. Pasang and I wanted to try the summit—almost unladen. Ajiba and Ang Nyima were to follow our tracks and bring a tent with sleeping bags. If they were unable to see us they were to put it up at about 24,500 ft. and to return to Camp IV.

"Tomorrow sure summit", said Pasang, beaming; "an easy mountain."

It certainly was not a bad plan, and when we mastered the summit later, we reached it from the same height in one day and we were then already exhausted.

Even without a sleeping pill, I fell asleep. What I awoke to was like a bad dream. An invisible force was pressing the tent-cloth against my face, depriving me of space in which to breathe, and around me was a hell of rattling, whistling uproar. It was a few seconds before I realised that this was no dream but reality. The gale had broken the tent poles, torn out the moorings from the ice, and was now dragging at the tent like a loose sail. It was pitch dark, so I knew it was still night. I felt for Pasang, and he too was awake. There was no reason to be really worried; we and our rucksacks were heavy enough to keep the tent on the ground. I moved further over towards the outside, made some breathing space for myself above my mouth and sank back into semi-consciousness. There was really no reason to worry; in the Himalayas a stormy night is often followed by a clear, calm day.

But when the daylight filtered through the tent-cloth the gale only increased in strength. It became more and more difficult to keep the tent down.

"Wait? Down?" Pasang enquired.

We had first to see how the two Sherpas in the other tent had been faring and what the weather was like.

It was quite an effort to creep out of the wind-flattened tent. Pasang went first and I followed, legs first. Without noticing it, I stripped the mittens from my hands.

Outside, it was hell. The sun had been up for perhaps two hours and was shining from a cloudless sky. A gale of such force and cruelty as I have never known before was sweeping the steep snow slope. It was impossible to stand upright; the unprotected parts of the face ached as if beaten.

"Never such gale", shouted Pasang; "we all die."

The other tent, too, had collapsed and under its fluttering surface I could recognise the crouching figures of Ajiba and Ang Nyima. Now they too crept into the open. Should we stay? Should we go? We had no idea how to save ourselves. I believed Pasang was right: that we were all going to die.

Suddenly the gale lifted up the Sherpas' tent like a sail, to tear it finally away. I threw myself upon it to save it. My hands, which until then I had kept in my pockets, sank into the snow.

What followed was very swift; it could not have taken longer than two or three minutes. And it was as if I did not experience it in my own body, but that I was watching a horribly grotesque scene from outside.

My hands went numb and white. I fumbled for my mittens in my own tent, but it thrashed about like a wild, unruly animal. I rubbed my hands and beat them against each other, but the gale bit into them with pitiless cruelty. I cried out from pain and impotence. Only now did the Sherpas see what had happened to me. Pasang and Ang Nyima undid their trousers and between their thighs my hands found a little warmth. It must have been a strange sight: myself kneeling between the two as if crucified, and all of us tortured by the gale and the cold. Meanwhile Ajiba had fetched my mittens out of the tent; I put them on, but knew that my hands were frozen. A panicky fear seized us: to get away from this inferno, where the gale could kill us within an hour. Hurriedly we crammed a few things into our rucksacks. Values had changed: a scarf was worth more than a Rolleiflex. The tents remained where they were. Perhaps the gale would destroy them completely, or perhaps we could recover them later on; but at that moment it was only our lives that mattered.

A Sherpa strapped on my crampons, then we roped up and the way back began. The gale tore at us constantly, threw us down, hurled slabs of snow and pieces of ice at us, while all the time the sun shone down from the cloudless sky.

We got lower and the force of the storm subsided; we secured each other with the rope over the steep pitch, and then we were back again at Camp III. Here were the Sherpas who were to bring supplies, and also Sepp. As he later told me, he had recovered and had wanted to join up again with the summit party. During the gale he tried vainly for many hours to master the ice-barrier. Again and again the gale threw him down. I showed him my hands and we went on down to Camp II without waiting. Sepp and the other Sherpas, too, abandoned Camp III. It was like a flight from annihilation.

Further down the gale was not so bad; the way over the ridge was easy, and unroped, alone and unhappy, I staggered towards the Camp. My hands had become shapeless, and they were unbearably painful.

Helmut, who had come up to Camp II, gave me an injection to promote the circulation—the first of many. With bare torso I sat between two rocks; Pasang held me from behind with both arms, like a mother, while Helmut, a Doctor whose speciality is Geography, not Medicine, tried to push the needle into regions known as intramuscular. Besides the torture of my pain and the torture of failure, I had a new and great experience, making the days that followed unforgettable: the wordless comradeship and friendship that bound us together and never allowed us to feel lonely.

Camp II was also to be abandoned. But I was too weak and tired to go. Sepp and two Sherpas stayed with me through the night. Then Pasang came to say good-bye: he wanted to shake hands, but when he saw my hands he bent down and kissed me on the cheek. I felt like a corpse to which one bids farewell.

Never had I dared to believe that scarcely two weeks later we would kiss again: again with tears in our eyes, but this time tears of joy, because we stood on the summit. But at that moment in Camp II I knew no hope, only the ever recurring thought that my hands were dead and the summit was lost.

And then, there was the eternal question: Why? Why could not the weather have lasted a day longer? Where and when did I make my great mistake? But no; on a purely material level the assault had been well prepared and no mistake had been made. Where, then, lay my inner mistake? Could a man be so cruelly punished without reason? These thoughts went round and round like a mill, endlessly. Was it perhaps my pride during the evening at Camp III? I had come to the Himalayas with the intention that this should be my farewell to these mountains and their high summits. And then, when we had discovered the way through the breach in the ice and Pasang had said, beaming: "an easy mountain, in two days we'll be on the summit", came the temptation. "If we climb Cho Oyu in two days", he said, "then you come back next year and we do Dhaulagiri." I had drunk in the unsurpassable beauty of the view over Tibet and forgotten my resolution. "Yes", I said, "I'll come back and next year we'll do Dhaulagiri."

Stupid, senseless thoughts, pursuing one another in circles, but not driving away the pain or the endless night in the tent. With touching patience, Sepp looked after me, for I could not undo a button or eat a bite without help.

Next morning we were all together again in Camp I, and we held a council of war. My hands would need medical attention, but the nearest doctor was at Kathmandu, three weeks' march away. Probably I would suffer more on the way than if I rested here and waited. So we decided to stay. Pasang was to go with two or three Sherpas to Namche Bazar to fetch our remaining supplies, additional flour, *tsamba* and half a yak. We would expect him back in ten days.

In the meantime, I was to nurse my hands. Sepp and Helmut wanted to climb one of the beautiful six-thousanders that surrounded us (which in fact they did), and when Pasang came back with fresh supplies we would quietly plan a second assault. We were no longer so depressed as we had been shortly after the catastrophe; hope had returned.

Whilst we were waiting, to our complete surprise the expedition under Raymond Lambert, which had sought to climb Gaurisankar, arrived on the scene. That mountain, Lambert told us, was impossible and he proposed a joint effort on Cho Oyu. But we felt that for this autumn, thanks to the express permission

of the Nepalese Government, Cho Oyu was "our" mountain, and in addition it was our desire to show that a very small group had an equal chance of success on an eight-thousander. This desire would have been frustrated by such collaboration, so we declined. In the end we reached the following agreement: Lambert gave us precedence on the summit; we were to try our luck again at the next favourable opportunity. Meanwhile, they would push their camps up to about 23,000 ft., and wait there for the result of our attempt. Lambert, having had experience of the autumn gales on Everest, did not want to lose too much time. "Each day is important for you and for us", he said.

Lambert's appearance had brought about a strange situation, a kind of race for an eight-thousander, which until then was almost completely unknown.

I do not wish to give the impression that this episode left any ill feeling between us; on the contrary, I should like to send greetings to Raymond Lambert on behalf of my two Tyrolean friends as well as myself, and to say how much I admire him for the real pleasure he showed at our success.

This occurred on the day after the summit. Very tired, with frost-bitten nose, hands and toes, I walked alone down the ridge to Camp II. A solitary figure came up to meet me, and as we drew close I recognised Lambert.

"The summit?" he asked in broken English.

"Yes", I said, "the summit."

It was no mere gesture but sincere joy that Lambert showed when he shook my hands and embraced me: "Congratulations, congratulations!"

The gale that was tearing at us as we spoke was for me the mountain's last greeting, but for Lambert it was a deadly threat for the days to come.

"Bon voyage", I said in wretched French. And I did indeed wish him a good journey.

We parted and some time later I turned round. High above was the summit, from which a wide plume of snow was fluttering, and far below it was the tiny figure of Lambert. How I admired the fact that he could be so truly glad at our success and yet be prepared to pit the human will once more against the will of the gods. Our sincere wishes go with him on his future journeys, which will surely lead him again and again to the Himalayas.

Anyhow, Lambert's arrival had hastened our plans. We could not quietly wait for Pasang's return, the additional supplies and the petrol we badly needed for our cooker. We had to return to the mountain just as we were.

We were not so hopeful and aggressive a group as we had been the first time. We had been through too much; we knew that the summit could only be reached in the most favourable weather conditions, and we had experienced the deadly force of the gale at 23,000 ft.

We wanted to avoid this gale as far as possible. So at Camp III we did not erect tents but instead we built ourselves a cave of ice. Reports of the warm comfort of an arctic igloo have always filled me with distrust, but here we learned to appreciate the building methods of the Eskimos. On the first day, three Sahibs and five Sherpas were accommodated in the narrow vault of ice, and with the help of the stove we soon produced a really bearable temperature. It was wonderful to hear the gale howling outside and not to have to fear being buried again beneath the tents. The storm kept us inside for three nights. Once, Sepp, Ajiba and Gyaltsen tried to advance to Camp IV, but they came back half-frozen after some hours. For one whole day we lay still in our sleeping bags and did not even venture outside our den, so bad was the weather; but we wished very much that we had by then been able to go "underground" at Camp IV too. Helmut gave me an injection every evening and the business of getting undressed was far less unpleasant in our cave than in a windy tent.

Nevertheless, we hoped for Pasang to return in time to refurnish our dwindling provisions and almost exhausted petrol supplies. But we felt that we could wait for him no longer. We had to get through to Camp IV.

Slowly, we made the necessary preparations in the confines of our shelter, looking forward without pleasure to the difficult march through storm and ice. Suddenly, one of the Sherpas reported three men coming up over the ridge. Lambert had in the meantime established one of his camps near-by, and it was very probably Lambert himself or his Sherpas that had been seen. Nevertheless, we clung to the unreasonable hope that it might be Pasang. And in fact, half an hour later, he crept in. He brought not only fresh supplies and petrol but new enthusiasm too.

His had been a unique performance. At Namche Bazar and later, in the village of Marlung, he had heard that Lambert's expedition had arrived. Almost without a rest, marching on into the night, he had covered the difficult way over the Nangpa La in an unbelievably short time and, apparently not in the least tired, was now determined to set off with us at once for Camp IV. "If Lambert reaches the summit before us I'll cut my throat", he repeated again and again with a realistic sweep of the hand.

Pasang's achievement was surely unique in the history of mountaineering—in three days he covered the difficult route (and very long, even in mileage) from Marlung at 13,000 ft. to the summit of the Cho Oyu at 26,750 ft. I do not think that there is today another man capable of the same achievement.

Half an hour after Pasang's arrival in Camp III we were on our way. On the steep pitch, I noticed how helpless I had become; I could hardly wield my ice-axe. Again the laborious way over the glacier, again an icy wind and cloudless sky, reminding us of our night of terror. But the snow, which two weeks earlier was

deep and brittle, was now hard and windswept—a great help. About 150 ft. above the ill-fated camp we put up the new Camp IV. It was impossible to dig a cave in the hard snow and we anchored two tents.

Six men stayed there overnight: Sepp, Helmut and I; Pasang, Ajiba and Gyaltsen. We wanted to try the summit the next day; that is to say, not we, but Sepp and Pasang. "Who is going?" Pasang had asked, and I had replied: "Sepp Sahib." Sepp was now very fit. Helmut was perhaps a bit too slow, and I, with my hands, was more a burden than a help. So Sepp was the obvious choice.

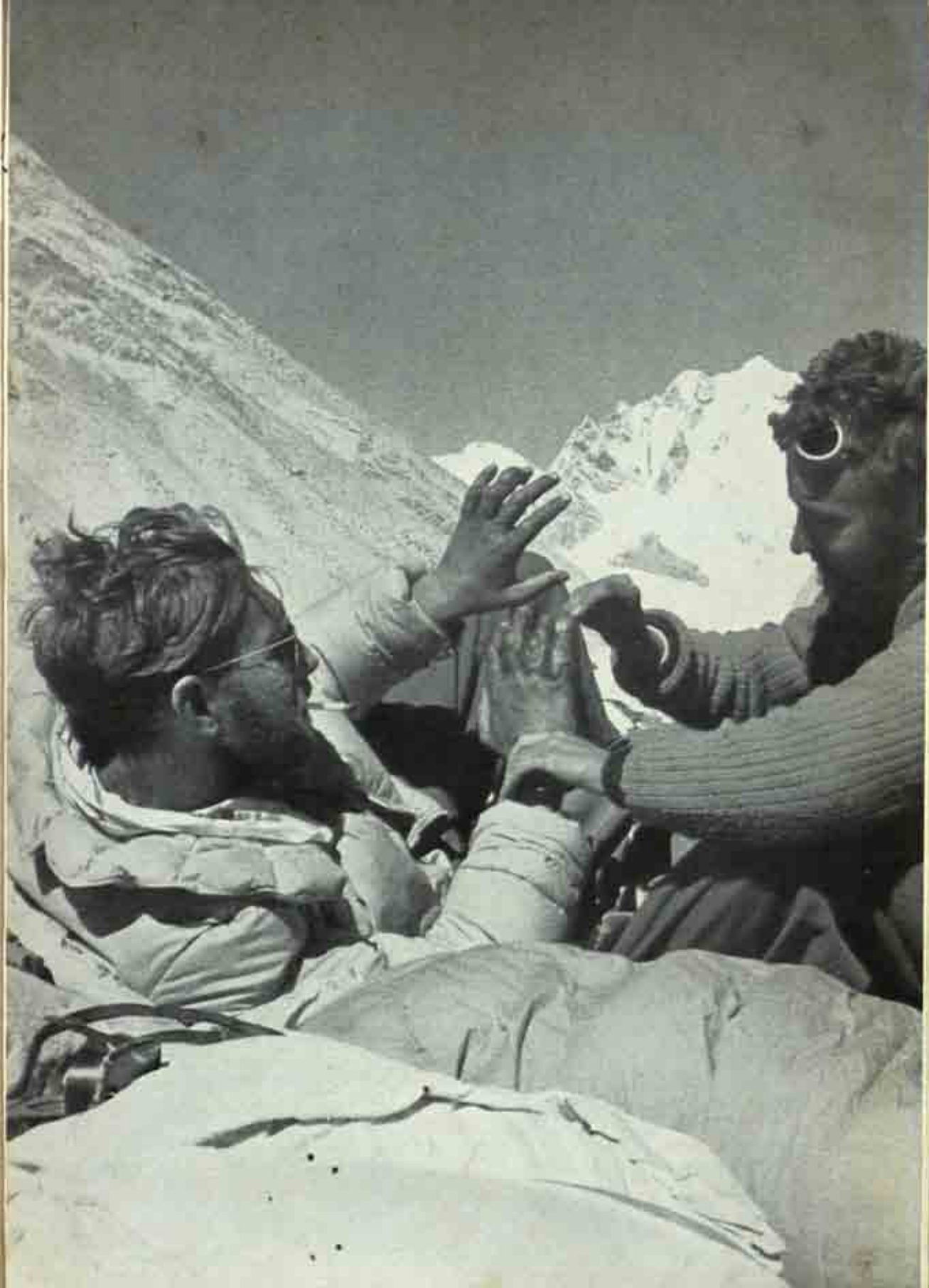
We lay in our sleeping-bags waiting for night-fall, I with Helmut and Gyaltsen in one tent, the summit team and Ajiba in the other. We were about 23,000 ft. up, but our altimeters showed less: so the chosen pair might have to climb more than 4000 ft. the next day—which is a very great deal, if the weather and the snow are not good. But nobody thought seriously of pitching a fifth camp.

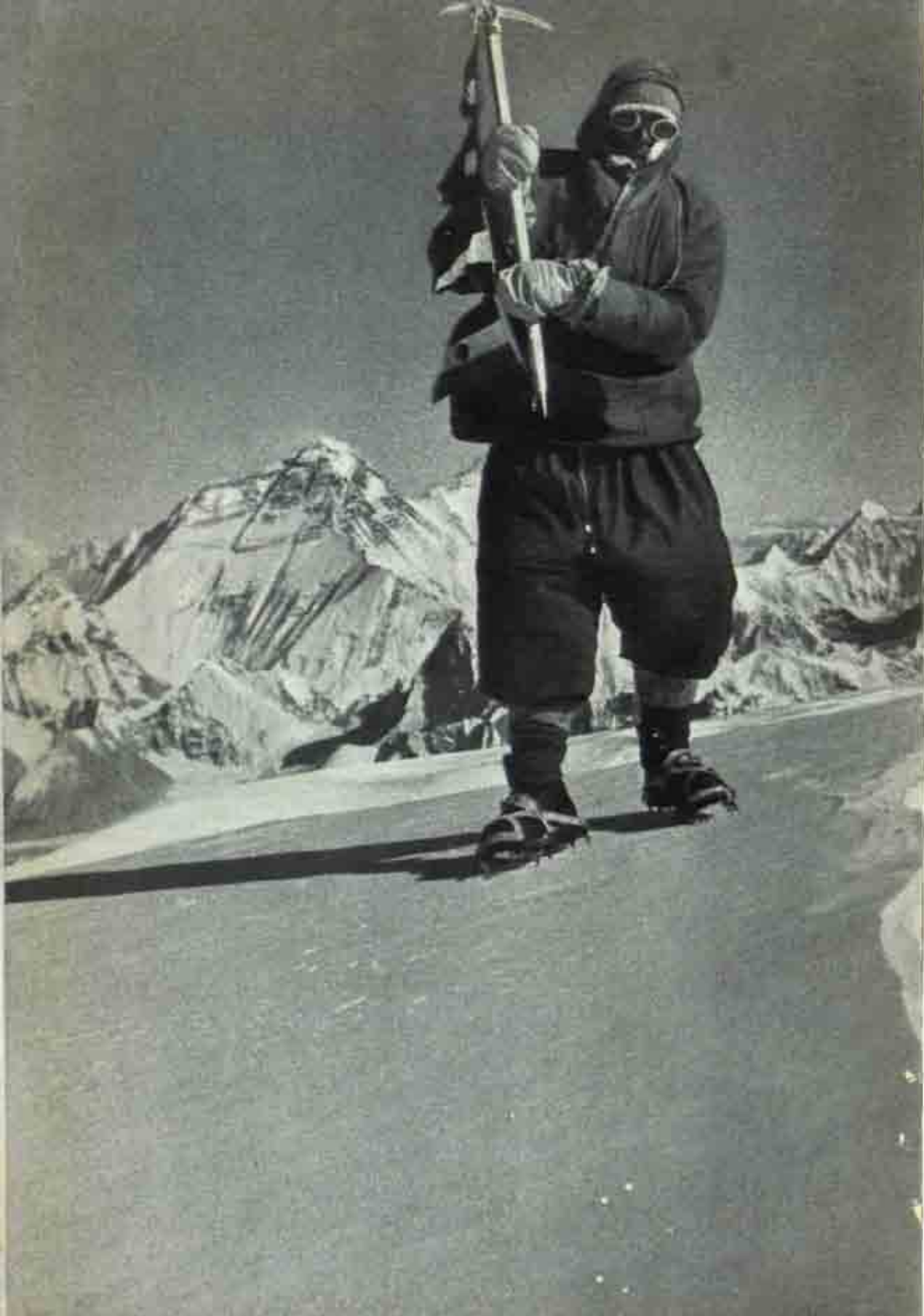
Whilst the gale tore at the tents, I brooded alone: a year ago, in Western Nepal, Pasang had mentioned Cho Oyu as a possible objective. Yes, I had then said, I will come and we will climb one more high peak together. As is by miracle, I had obtained the permission of Nepal and the necessary money, and now I was lying there, only one day's climb from the summit. "I'll lie here tomorrow too", I thought, "inactive and awaiting what fate has in store for the other two." I hated my helplessness. "If I wrap my hands up warmly and if the summit is not too difficult—perhaps I can go too?" I went on. But a few hours' gale and my hands would be finally, irrevocably dead. Could I take this risk? These thoughts ran through my mind endlessly. Then I suddenly knew: if I were not prepared the next day, at an even higher stake than hitherto, to try my luck, then I had no business even where I was. We were going to do without the rope (at least as far as the route could be seen from where we were) so I could turn back at any time without delaying the other two.

I crawled into the other tent and said: "I am going with you tomorrow." "Fine", said Sepp, "I was hoping for that." Pasang nodded: "Atscha, good." I was immensely grateful to both of them. We wanted to start before dawn, while the waning moon still gave some light.

A sleepless night. Three men are too many for one tent. It was still dark when I heard sounds from the other tent. After a long time, Ajiba's voice was heard: "Breakfast", he said, and he put a cup into my hands. Cocoa, then a bowl of porridge. Outside, it grew slowly light. I felt that I ought to get up, but lay as if paralysed by doubts. I roused Gyaltsen, and with great difficulties he put the

Plate 27: With injections for promoting the circulation and with tireless attention, Helmut Heuberger, Doctor of geography and not medicine, treats Herbert Tichy's hands, which were frozen in a few minutes during a storm at Camp IV (23,000 ft.).





frozen boots on my feet. I crawled out of the tent into the ice-cold morning. The sky and the mountains of Tibet were blood-red. Sepp and Pasang packed their rucksacks without a word. Pasang fastened my crampons. After the warmth of the sleeping bag I could move my hands and I tried to grasp the ice-axe with my right hand; soon the hand would grow stiff and hold the axe like a clamp.

From camp our way led steeply upwards over the slopes of *névé*. I tried hard to take the first steps slowly and to breathe consciously. Pasang went first; Sepp was behind me. Sometimes we were very close together, sometimes we could hardly see each other. But everyone moved really by himself, strengthened however by the presence of the other two. In the shadowed flank it was bitterly cold; the surrounding peaks glowed in the sunlight, but there was a long way yet to go before the first rays fell on us, cold and impersonal.

So far I had managed quite well, but then we reached the rock band, which surrounds the summit like a symbol. A few feet of steep rock and ice—a small matter—to be climbed through in a minute, but I tried in vain to take hold of the rock with my hands or to pull myself up with the ice-axe—useless pieces of flesh, aching unbearably when bumped against the rock. Still struggling, I heard Pasang's voice above me: "Rope, Sahib!" In a few seconds I was at his side, and without further word he put the rope back into his rucksack.

Sepp complained of numbness in his legs. I hardly felt the cold, but the next day I noticed slight frost-bites on my toes and nose.

Further and further up, the slope grew steeper, but the crampons held well. Each step took many breaths, but without exertion, and I was surprised how easily I was still walking.

The surrounding peaks sank slowly and the blue sky of Tibet—old friend of many adventures, confidant of many unforgettable hours—grew wider and bigger. My thoughts became free; memories floated through time and space. We had reached the shoulder where we had wanted to pitch Camp V. We took a few sips of hot coffee, Pasang tipped some fomented rice into our mouths. We left the rope behind and continued without pause. The gale we had feared had subsided; it was now only a wind, and for the last stretch it even took us from behind and pushed us forward.

Again, each one of us was moving alone and by himself. We now entered the so-called fatal zone, the region around 8000 m. (26,250 ft.). I knew that many a mountaineer at this point had had visions that helped him and had heard friendly voices. I stopped because I wanted to hear whether anyone spoke to me. I expected to hear the voice of my dead father, but silence prevailed. Yet I was not

Plate 28: Pasang Dawa Lama, the great Sherpa, on the level summit of Cho Oyu (26,750 ft.). On the horizon, left, Everest and the South Col.

disappointed. The world around me showed a kindly benevolence, such as I had never before experienced; snow, sky, the wind and myself were an indivisible and divine whole. It was a mystical experience, a nearness to the divine and the essential, never felt before. An indescribable, impersonal happiness filled me, which was not affected by the fact that I was convinced that we were all going to die. Stupid and unreasonable, but that is what I thought. It was my view that I would not get back to camp again, nor even the tent which Ajiba and Helmut were to follow us with. We should have to bivouac and freeze to death. But this thought was somehow included in the happiness of my mood, and it did not make me hurry. Every second I was conscious that I was experiencing something uniquely beautiful. I had broken through a metaphysical barrier and had reached a new world.

The slope became flatter, the vision wider, and suddenly, the slope no longer rose before me and there was only a limitless view. Pasang came towards me; his ice-axe was stuck in the snow and from it fluttered the flags of Nepal, Austria and India, which we had given to him in the morning. I am usually no friend of flags, but the symbols of my fatherland and of the two countries to which I owe so much and love so dearly, brought tears to my eyes. Pasang embraced me. Under his sun-glasses I could see tears. For over twenty years he has been a "Sirdar" and has striven for a "very high" mountain. That day his wish was fulfilled. Sepp came up. How glad I was that the three of us were there. We embraced again, and again there were tears and none of us was ashamed.

We took the customary summit photos, Sepp using my camera, as I was unable to handle it. I tried to raise the ice-axe with the flags, but my hand was too weak to hold it.

We ate chocolate and sweets; Pasang and I buried some of them as sacrifice for the gods. With the ice-axe I tried to dig a little hole for them in the hard snow, but my hands were clumsy and I had to kneel in order to do so. I remained in this attitude for a few seconds and thought it the only proper attitude for me at that moment.

At three in the afternoon of October 19th, 1954, we had reached the summit; half an hour later we were on our way down. Again, each one went by himself. The sun sank lower and lower, but we should reach Camp IV all right.

At the rock band Helmut was waiting for us with a tent. He knew from Pasang already that we had been on the summit and his whole face was beaming.

Then came the last steep slopes down to the camp. The mood was the same as in the morning when we started off in the red dawn over Tibet. I staggered, falling sometimes, but was able to check each fall. I knew that each step was a farewell to the Himalayas, which I had known for twenty years. It was not, however, a last glance, but a consciousness of the parting of ways. And it was

good to bid farewell at a climax. I stopped again and again and the memory of what I saw is ineffacable.

The shadows had risen when I reached the camp. Ajiba cowered before a burning stove. He came towards me and embraced me: "Sahib", he said, pressing me to himself. But it would not be my good old Ajiba if he were to leave it at that. He took a bowl from the stove and gave it me. I drank in long, thirsty gulps; it was hot schnapps. Sepp and Helmut arrived. The night enclosed us. Again I was lying sleepless in the narrow tent, my tortured hands aching, but I was filled by the joy of success and the warmth of our friendship.

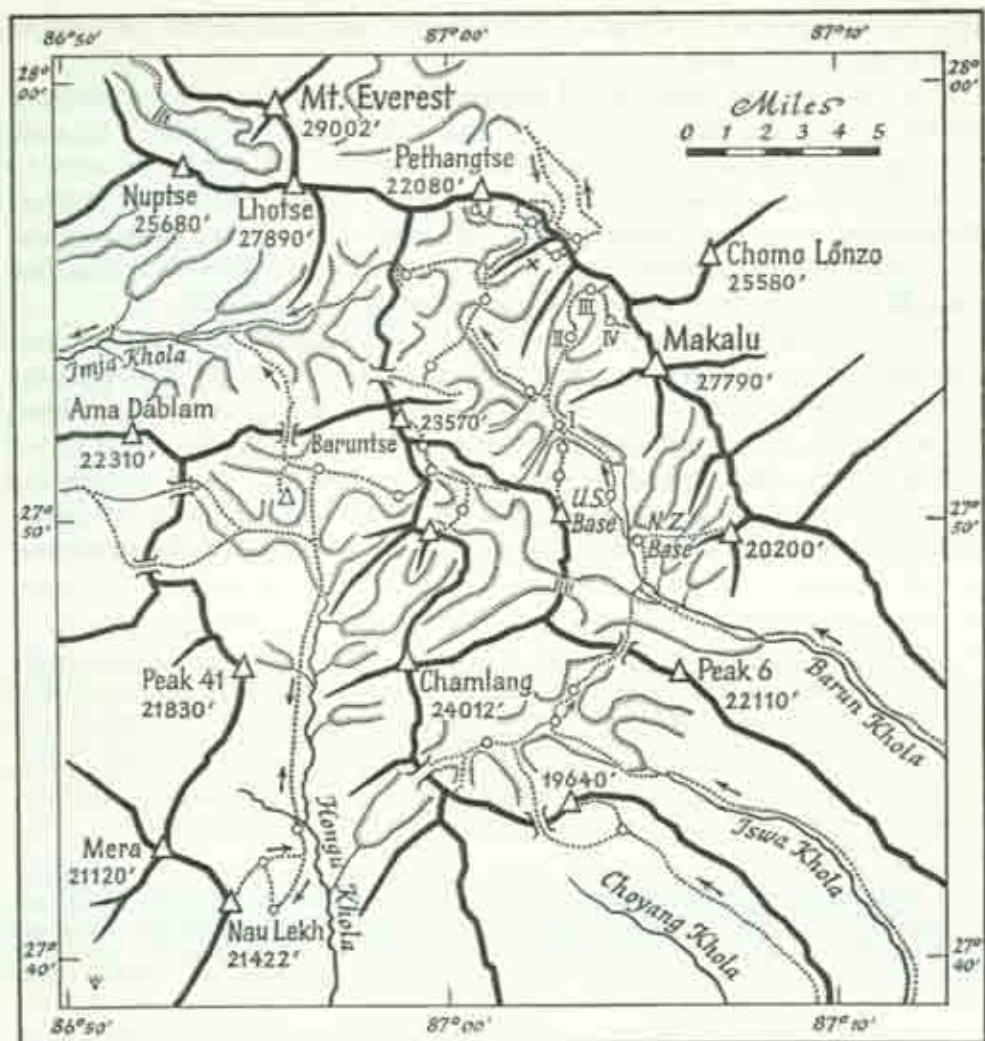
The march back to Base Camp and then to Namche Bazar went according to schedule. There we rested for a few days, made an excursion to Thyangboche, and on November 22nd we were again at Kathmandu. The government of Nepal had sent us the most touching telegram of welcome to Namche Bazar—it ended with the words: "We shall not be happy until your frostbitten hands and feet are well again"—and we were once more made aware of the generous accommodatingness that alone makes each journey in Nepal an unforgettable experience.

Editorial Postscript:

The Lambert expedition chose another more northerly route on the western bulwark of Cho Oyu; the two ways coincided as far as Tichy's Camp II. Cold and storm forced the Lambert expedition to build their main Camps II, III and IV in the form of ice caves, so as to be ready immediately after the Austrian's assault. On October 17th, while Mme. Kogan and Lambert prepared the 200 ft. high ice-wall, Pasang Dawa Lama hurried in one day from Thami over the Nangpa La to the Austrian's Base Camp, on the 18th to Camp IV (23,000 ft.) and on the 19th with his Austrian friend to the 26,770 ft. summit. It was just the right day, brilliantly fine and almost still, the wall deserved reward for a truly great performance.

On October 21st the descending Austrian and the ascending Lambert party met. Now the way was free, but—on the 23rd the temperature fell to -25° C. (43° of frost F.) in a strong wind, on the 24th to -30° C. (54° of frost F.), and the next day was scarcely better. On October 28th Mme. Kogan and Lambert made a last desperate attempt from Camp IV (23,460 ft.), but at 25,260 ft. (according to other estimates, 24,235 or 24,770 ft.), they had to give up. Winter storms had come; for Cho Oyu it was too late.

Thus the compulsive element of time, in which the Tichy expedition was lucky, prevailed in the end, so that the Austrian, with his magnificent Strider Pasang Dawa Lama, made great speed, seized the best of all days and was very successful. Then the mountain said inescapably "No!"



A survey of the peaks and passes adjoining the Barun Valley. South-east of Pethangtse a cross marks the position of the accident on the 27th April, 1934.

AN EXPEDITION TO THE BARUN VALLEY

By George Lowe

In 1952, the end of the Cho Oyu Expedition, a small party consisting of Eric Shipton, Charles Evans, Ed Hillary and myself, pushed across a pass to explore the base of Makalu. It was during June, while the monsoon was approaching, and we crossed some exciting mountain country, finally reaching a pass at the head of the Barun Glacier before deluges of monsoon snow made us retreat down the Barun Valley to find our way out to the Arun River.

The Barun Valley was extremely beautiful; it was locked in by towering rock cliffs with cascading waterfalls. The floor of the valley was filled with flowers and grassy flats. The glacier at the head, although exceedingly rough and stony, led to a great choice of interesting summits with unmapped corners between Makalu and Everest. A high pass was the only way out of the valley as the junction with the Arun River, only 4000 ft. above sea level, guarded effectively by thick bamboo jungle and precipitous gorges, made this exit too tortuous. Late in June, as we walked towards the Indian border through the steaming valleys up the lower Arun, Hillary and I resolved to return to explore the country in the vicinity of the Barun Valley. In 1953, from high on Everest, we looked across to Makalu and saw a possible route by reaching the North Col of the mountain from the Barun Glacier and following the north ridge to the Summit.

With these enticing objectives put forward, the New Zealand Alpine Club organised an expedition to visit this area. Permission to visit the "Barun Valley and peaks" was the wording that we used on the understanding that Makalu would be the main peak reconnoitred, but permission to attempt Makalu was given to a Californian party, who asked explicitly for that mountain, and permission was granted to our Expedition to explore the Barun Valley and peaks not including Makalu.

When this position was clarified, the expedition gave itself two objectives, the climbing of peaks with a view to looking from afar at the routes on Makalu, and making as complete a survey of the area as possible. And so it was that the party had three able surveyors, with three photo-theodolites loaned by the Royal Geographical Society.

Norman Hardie and Jim McFarlane were both surveyors and civil engineers from New Zealand, assisted by Charles Evans from England, who was also a

competent surveyor, comprised the survey team. Dr. Michael Ball from England was invited to join the expedition as a doctor, and the remainder were from New Zealand and consisted of Sir Edmund Hillary, Geoff Harrow, Colin Todd, Brian Wilkins, Bill Beaven and myself.

The expedition gathered on the Nepal border at Jogbani on the 28th March, and from there travelled by lorry for 30 miles of dusty plain to Dharan. Some 200 coolies were engaged here and we left on 1st April for the sixteen-day journey up the Arun Valley to the rivers which give access to the mountain area near Makalu.

After a week's march we reached Khanbari, where we spent some days rearranging coolies, as the men from the lower valleys did not wish to carry beyond this point. And, as it is the last bazaar of any size, we took on a good number of loads of rice, flour, salt and cooking fat, needed to complete our food supplies.

Here also we divided the party into three groups to follow out the plan of exploring three valleys and making a rendez-vous in the Barun Valley at the foot of Makalu. The Choyang, the Iswa and the Barun are the three mountain rivers that flow south-east from the mountains at their heads and join the Arun within a few miles of one another.

Evans and Harrow planned to explore the Choyang and cross from its head waters into the head waters of the Hongu Valley, and from there up the Hongu and over two passes used in 1952 to the Barun Glacier. They were to take a theodolite and try and complete a survey. Beaven, Hardie, Todd and myself were to force a way up the Iswa Valley and from there, mapping as we climbed, try and make a pass direct into the Barun Valley. Hillary, McFarlane, Wilkins and Ball had the double task of making their way up the Barun Glacier with the main expedition baggage, and completing a survey as well. Certain peaks were agreed as theodolite fixes to link the triple survey together. These journeys would also serve the purpose of acclimatisation for later high climbing, and it was arranged that we should try and meet at an agreed Base Camp in the Barun Valley by the 30th April.

Evans' exploration began first. He left the main party soon after crossing the Arun rope bridge, which is on the main trade route towards the Popti La and Tibet. From there he traversed the ridge between the Choyang and Iswa valleys, looking for a suitable chance to drop off to the Choyang floor. The Choyang was very steep-sided and filled with very thick bamboo and rhododendron growth in which no tracks could be found, and for several days they traversed the ridge dividing the two valleys before finding a way down. They climbed a peak of 19,800 ft. on the watershed between the Choyang and the Iswa, but early cloud upset their hopes of a survey station. On the 25th April, after failing to find a

pass from the head of the Choyang to the Hongu Valley, they climbed out of the Choyang and made an easy pass into the Iswa Valley.

While the other parties were exploring the Choyang and the Iswa, Hillary's party had the tedious job of double-packing the hundred odd loads up the ridge between the Iswa and the Barun and down into the upper gorges of the Barun River. This devious route is the easiest way into the Barun Valley, as below the point where the route meets the valley floor, the river leaps down in cataracts between tremendous cliffs to the Arun junction. The local people have never been successful in finding a way by the lower Barun. As with the Iswa party, Hillary's party had to deal with deep snow lying in the rhododendron jungle on the pass above the Barun River. Most of the porters carried up to the pass in bare feet, but after the first day gave up. The loads were then double-packed by some nearby villagers clad in boots and some sixteen Sherpas who had joined the expedition in Dharan. McFarlane pushed ahead of the main party with the theodolite to make survey stations, and choose a site for Base Camp at about 16,000 ft. on river terraces close to the terminal of the Barun Glacier. Base Camp was placed about half a mile from the Base Camp of the Californian party, who were attempting Makalu. The Californians had already been established some two or three weeks, having entered the valley by the same route. From Base Camp, Makalu dominated the view; it is a glorious mountain, which reaches up cleanly from the valley floor in sweeping rock curves to the snow plumes sweeping from its summit.

The journey up the Iswa Valley began on 16th April, when Beaven, Hardie, Todd and myself left the Barun party below the pass which leads to the Barun and plunged down through trackless forest to the Iswa River. With us were ten Sherpas carrying 60 lb. each, while ourselves, as yet unfit, were carrying 40 lb. We followed down a steep creek and were soon involved in descending snow gulleys and occasional waterfalls. Progress was slow and we dropped packs and set out to reconnoitre. After seven hours of climbing, sliding and breaking our way through bamboo and rhododendron we climbed a great tree and looked far below to the river which was leaping down over huge boulders. Progress downwards became increasingly difficult; we had almost decided to abandon the attempt when Todd made a cast to the left and struck an old trail. It was too late to move on and we camped where we were in a thicket of brambles. Next day at 6 a.m. we pushed off and followed the track which Hardie had worked on by torchlight, cutting blaze marks into the tree trunks with a kukri. We reached the river and turned upstream. The trail continued and even though sketchy and very rough we made good progress. For two days at much less than one mile each day we struggled up towards the glacier. Two mountains beckoned at the head, two beautiful summits; one the Chamlang Massive, apparently unclimbable, with

a huge wall supporting a four mile long summit ridge; the other, Peak Six, a shapely fluted spire of 22,000 ft.

On the fourth day of toil we emerged into a grassy flat with the Iswa River running quietly across the plain. Down valley the bush leapt down in distant ridges. It was a thrill to emerge from the jungle struggle into this delightful field with mountain walls to hide it away from the non-explorer.

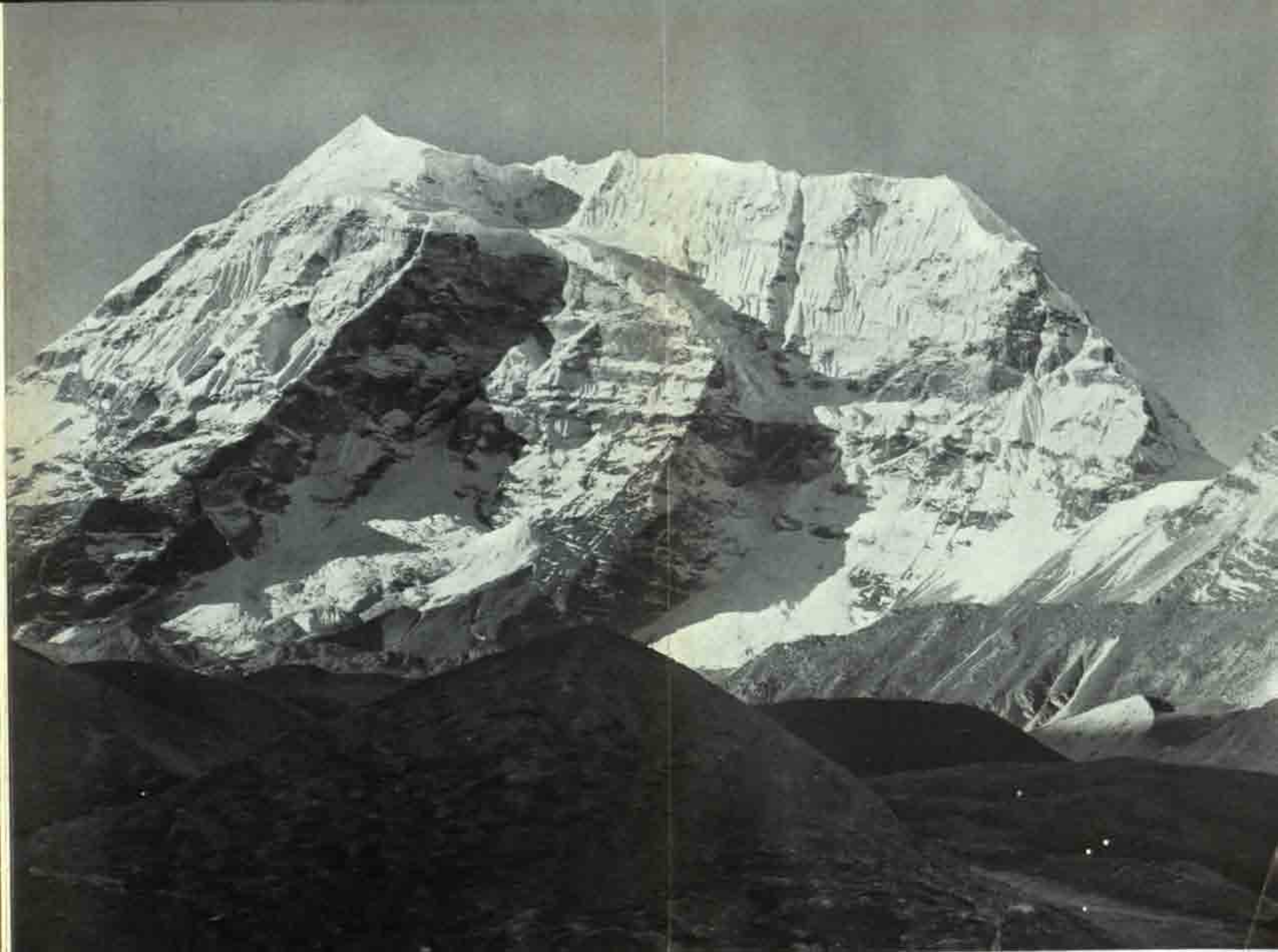
The cliffs were a feature of the valley. Never, except perhaps in the Barun, had I seen such rock walls. They were streaming in many places with threads of waterfalls. One night we camped on a beautiful flat at the foot of the cliffs. All round the camp there were holes in the ground and Hardie thought they were mole holes, except they varied so much in size. We grew curious and dug down to find jagged rocks deeply embedded. We realised then that rocks fell from the cliffs above and screamed down like fiery meteorites and buried themselves deep in our chosen camp site. We moved our camp.

Two days later we camped on the Iswa Glacier at approximately 17,000 ft. The massive four mile wall of Chamlang (24,012 ft.) was the chief feature. The whole length was draped with ice-falls and cliffs. There was no way up the mountain from the Iswa Valley. Of the other peaks, Peak Six was the most attractive but no easy way could be seen. There were many other peaks and all steep and difficult and our first thoughts were directed to finding a certain way out of this repellent valley.

Most surprisingly, a low and apparently easy gap of perhaps 18,000 ft. showed between the ice-falls of Chamlang and the ice-flutings of Peak Six. On 21st April, Todd and I climbed up and found that it was indeed an easy pass to Barun Valley. With this escape route setting our minds at ease we then explored all tributaries of the glacier, reaching a pass col which overlooked the Choyang and another which overlooked the Hongu. Evans later crossed the first, but we did not think the Hongu side of the Hongu Iswa Col was very easy and did not descend. Two peaks were attempted unsuccessfully. Both were very difficult and we found that we suffered too much from the altitude at this early date to push them to a successful conclusion.

Having now thoroughly explored the Iswa, we followed the escape route over the pass between Chamlang and Peak Six, which we had discovered in the first few days. It was an easy pass of some 19,000 ft., which took us between the fluted cliffs of Peak Six on the right and the massive ice-falls of Chamlang on the left. The descent into the Barun was straightforward, and two days later we reached

Double-plate 29/30: The provisionally-named Peak 6 (22,110 ft.) rises to the south-west above the tongue of the Plateau Glacier like a veritable Breithorn. The Iswa Glacier flowing south-east from Chamlang is reached via the pass to the right.





Base Camp. We found nobody in occupation until later that evening Ball arrived with one Sherpa, having climbed a peak of 20,200 ft. on the south-east ridge of Makalu. This was marked on our maps as a low peak of Peak Three.

Ball reported that Hillary, McFarlane and Wilkins were climbing and surveying at the head of the Barun Valley and were due back at Base Camp in two days. On 28th April we rested at Base Camp. At 7 a.m. the following morning Hillary and a Sherpa arrived with the news that an accident had occurred at the head of the Barun involving Wilkins and McFarlane. McFarlane was badly injured and seriously frostbitten.

On the 27th April, McFarlane, Wilkins and Hillary and one Sherpa had climbed a peak of 21,300 ft. After this Hillary and the Sherpa descended to Camp while Wilkins and McFarlane continued on to reach a col of 21,000 ft. which overlooked the Kanshung Glacier. From the col they descended a branch of the Barun Glacier towards Camp, and when only 300 yards from the terminal face of the ice, Wilkins plunged through a light snow covering into a deep crevasse. McFarlane, who was following, was carrying most of the coils in his hand, so that they were separated by some 35 ft. of rope. The surface was icy, and in the jerk of the fall McFarlane was pulled on his face. The rope flicked out as Wilkins dropped down the crevasse. McFarlane could not get a purchase on the glassy ice and was pulled along the surface and down into the chasm. They both fell 60 ft. to a snow-filled bottom about 18 in. wide. Because of the rope Wilkins was saved an uncontrolled fall and reached the bottom practically unhurt. McFarlane was pulled headlong into the crevasse, damaging his back and head by hitting the sides, to land in an upright position, 2 ft. to the left of Wilkins. McFarlane suffered concussion and because of his injuries could not move. Wilkins tried to move his companion, and failing this, decided to try and get help. He made his way along the floor of the crevasse for some 12 ft., to where it narrowed above to 2 ft. in width. In 2 hours he clawed his way up to the surface, where he unroped and clambered out. Wilkins reached camp at half past five and gave warning. Hillary with five Sherpas left immediately, carrying sleeping bags and ropes, and hurried to the scene of the accident.

Darkness was coming on and a cold wind was sweeping across the glacier. Hillary tied on to a rope and the five Sherpas lowered him down the crevasse. When 50 ft. down, the Sherpas became afraid of approaching the edge too closely and would not lower him any further. Although 50 ft. down and within 10 ft. of McFarlane, Hillary could not see him, even though he flashed a torch, because the crevasse slanted away too steeply. After a great deal of shouting, Hillary was

Double-plate 31/32: View from Pothangtse of Makalu (27,790 ft.) and its satellite, lying to the north, bearing the misleading name of Makalu II (25,130 ft.).

pulled up to the top again, but the rope had cut into the lip of the crevasse and he had the greatest difficulty in getting out. In doing this he threw his arm over the lip, and the Sherpas, putting severe strain on the rope, levered him out, breaking two or three ribs in the process. A rope was lowered to McFarlane who painfully managed to tie himself to it. Twice he was pulled to the surface and twice lowered to the bottom as he could not be got over the lip of the crevasse. A shouted discussion was carried out between McFarlane and Hillary about the possibility of spending the night in the crevasse with warm protection. Accordingly, two sleeping bags and an eiderdown jacket were lowered to McFarlane, and although he shouted replies to say that he was safely inside the sleeping bags, in his concussed condition he merely laid them across his lap. In this way he passed the night. Hillary and the Sherpas descended to Camp, spent an uneasy night, and were back before dawn next morning along with Wilkins. Wilkins very pluckily descended the route by which he had climbed out of the crevasse and attached ropes to McFarlane, and, after a great deal of the ice of the overhang at the top of the crevasse had been carefully removed, McFarlane was pulled to the top and lifted out.

McFarlane had spent 16 hours in the crevasse. His hands and feet were badly frostbitten, and although conscious, he was in a very bad way. From the frames of three Sherpa rucksacks, a stretcher was improvised and they lifted him an hours walk, off the ice, into Camp. Later the same day, Hillary and a Sherpa set off down valley for assistance. They did not make the whole of the distance to Base Camp that day, but spent the night on the Barun Glacier in a tent that they had carried with them, and arrived at Base Camp at 7 a.m. on the morning of the 29th April.

It was very lucky that Michael Ball, the doctor, was with us, as he was due to go back down the Barun to escort the last of the loads to Base Camp. Two hours after Hillary's arrival, Ball and myself, as I knew the position of the accident from having visited that area in 1952, set off with light packs containing medical equipment, and, using Hillary's tent on the glacier, reached the site of the accident very early the following morning. McFarlane was given an exhaustive examination by the doctor, who decided to move him in slow stages to Base Camp, to rest him there for some weeks so that he could gain strength for the exhausting journey to the Indian border.

Although he saw that McFarlane's hands and feet were badly frostbitten and quite possibly he would lose portions of them, Michael Ball felt that waiting, even some weeks, could do very little harm to the limbs, and would allow McFarlane to get over the concussion and shock of the fall. Two sleeping bags, an eiderdown jacket, cameras and survey equipment were still at the bottom of the crevasse. With Wilkins and Todd, who arrived later that day, and several

Sherpas, I went to the scene of the accident, descended the crevasse and retrieved all the equipment. Measured by the length of the rope, the drop was fully 60 ft., and considering the ice-projections and slanting sides of the crevasse, it was incredible that they were not both killed in the fall.

The following day, we carried McFarlane on an improvised stretcher some miles down the Barun Glacier. Three days later, after the most exhausting carry, mostly over miles of moraine-covered ice, we reached Base Camp. Both patient and carriers were quite exhausted. McFarlane could stand about four hours of movement in any one day, as it seemed that he had displaced some of the vertebrae in his back. Hillary was resting in camp, having had his ribs strapped. Charles Evans and Geoff Harrow had arrived from the Choyang exploration, and so all were now assembled at the base of Makalu.

The Californian Expedition were camped some half a mile away up the valley from us and were then attempting the south ridge of Makalu. From Base Camp we could see that they had established a camp at 21,000 ft. and were attempting the very formidable rock ridge above it. The doctor of the Californian party made several visits to McFarlane, and he, and in fact the whole of the Californian Expedition, gave every assistance and were even prepared to call off their expedition in order to assist us to get McFarlane to the Indian border. This very sporting offer we declined, as we felt that when McFarlane was stronger we could hire men from the village of Sedua to carry him out in easy stages.

Having recast our plans a small party consisting of Evans, Harrow, Todd, Beaven and myself began an attempt to reach the North Col of Makalu, then perhaps from there attempt to climb Makalu II, with the idea of observing the final slopes of Makalu from this vantage point. A few miles up the Barun Glacier a tributary glacier flows in from the western slopes of Makalu. We ascended this tributary glacier, which we called the "Makalu Glacier" and placed a camp at about 20,000 ft. From this camp, which we called Camp III, Hardie, Todd and I reached a col of 21,500 ft. immediately to the north of Makalu II. From the col we looked down into the glacier which drains Chomo Lonzo and Makalu II and joins the Kangshung Glacier, and we looked across to the west face of Makalu and could see fairly easy glacier terraces leading most of the way to the North Col of Makalu. On the same day, Evans, Harrow and Beaven established Camp IV at about 22,000 ft. on the glacier terraces.

The following day, Hardie and I climbed a peak of some 22,000 ft. to the south of the col, by a very steep ice-ridge, which gave us a good view of the north ridge of Makalu II. The view confirmed our first opinion that the ridge was not the easiest way to the top of the mountain. Evans and Harrow were at that time attempting what we all thought was the most likely line, up the terraces towards the North Col. We could see them kicking steps up a long steep snow

gully, and after making a thousand feet above Camp IV they broke out to the right to a flat snow shoulder. This was chosen as a tentative site for Camp V.

On the 17th May, Hardie and I, together with Hillary and Wilkins, who had come up from Base Camp after resting, set off for Camp IV to relieve Evans and party. Hillary had had sixteen days rest in which to repair his ribs and he felt that he was now fit again. We had with us seven Sherpas, carrying ropes and pitons to fix over the slopes to the Col, and further supplies of food.

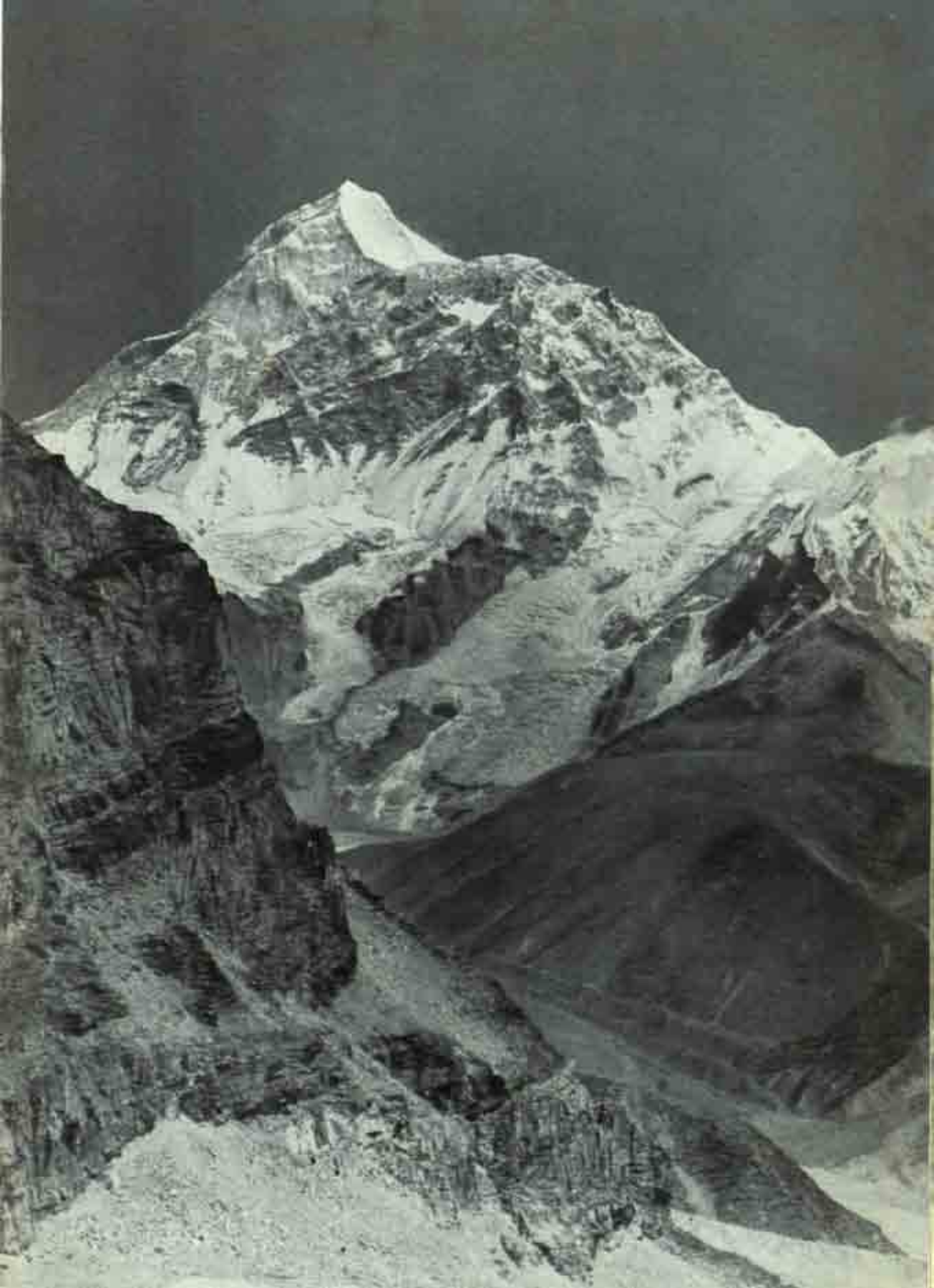
We reached Camp IV before mid-day, but Hillary had found the ascent caused his breathing some distress.

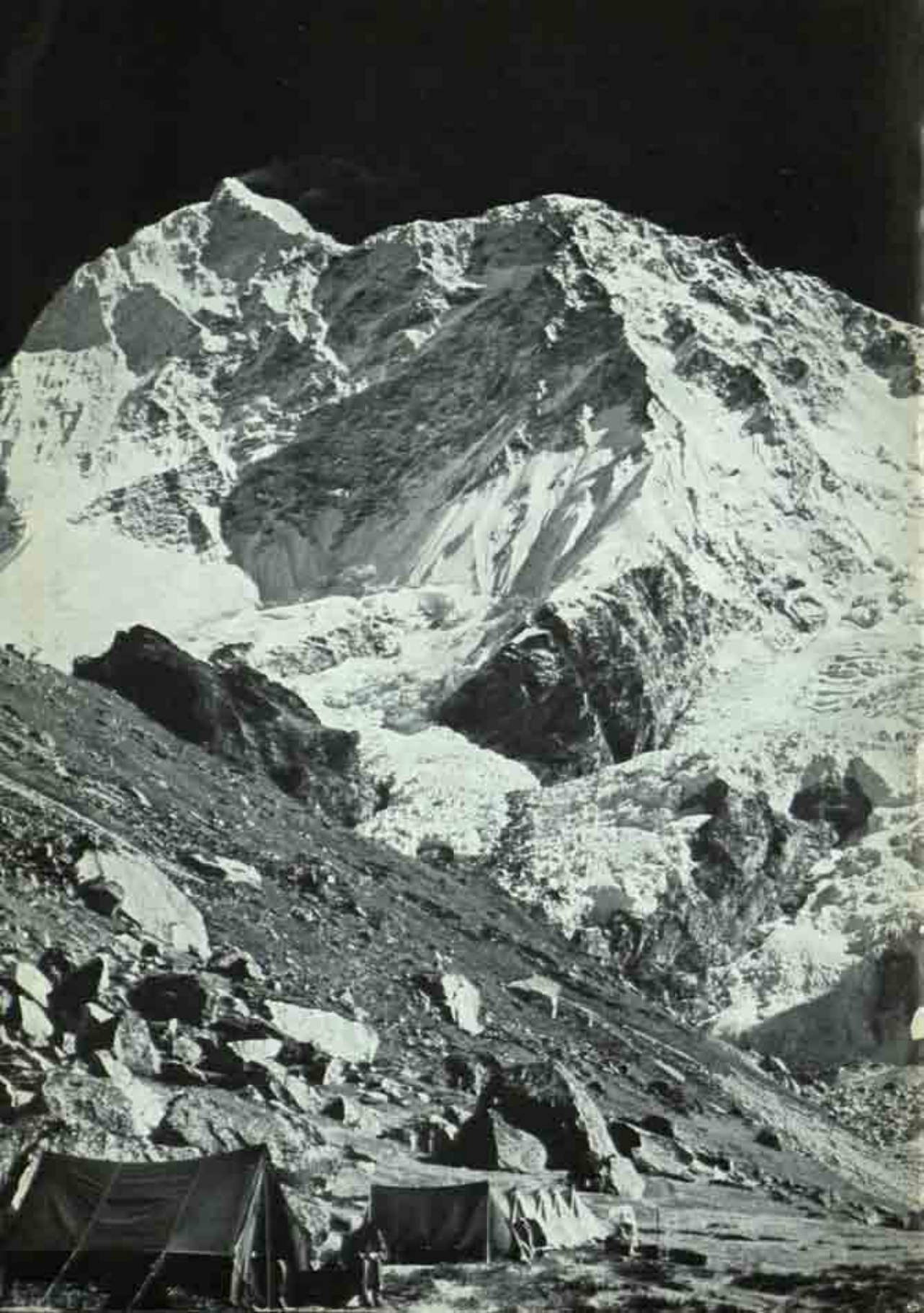
The following day, Wilkins and I ascended the route which Evans and Harrow had reconnoitred and fixed 200 ft. of rope across the icy section in the bottom of a snow gully. On our return we found that Hillary was feeling very ill and was coughing and vomiting. He spent a very disturbed night, and the following morning it was decided that we would all accompany him back to Camp III. With four Sherpas carrying our packs, we began the return, Wilkins and myself assisting Hillary at each arm, while Hardie was roped between us and the Sherpas, as a safe anchor. We had made some half of the distance towards the lower camp when Hillary pitched forward on his face and became delirious. We emptied the packs and with these made an emergency stretcher, while Hardie and one Sherpa hurried to Camp III to get assistance. During this very exhausting carry, Hillary was delirious and kept talking of two fears: one that he was being frostbitten, and the other that the sun was so strong on the back of his neck that he was getting sunstroke. His breathing and pulse had both increased to an alarming rate. It was quite clear to us that he was desperately sick and the sooner we could get him down to lower altitudes the better. Near Camp III Charles Evans met us with a relief party and Hillary was rushed down to the tents. After a rest and a sponge he regained consciousness and fell into a fitful sleep.

Evans, who was also a doctor, decided to rest Hillary in the tents at Camp III and sent a request to the Californian party for one of their emergency oxygen sets which they had for medical purposes only. Evans was not sure whether Hillary had pneumonia or not, and ordered this in case of emergency. Hillary had all the symptoms of being dangerously ill; he had become very dehydrated, and his tongue had become swollen and ruffed, which made it very difficult to take in any liquid. Water was given to him on every possible occasion and during the night he was able to sleep when oxygen was administered.

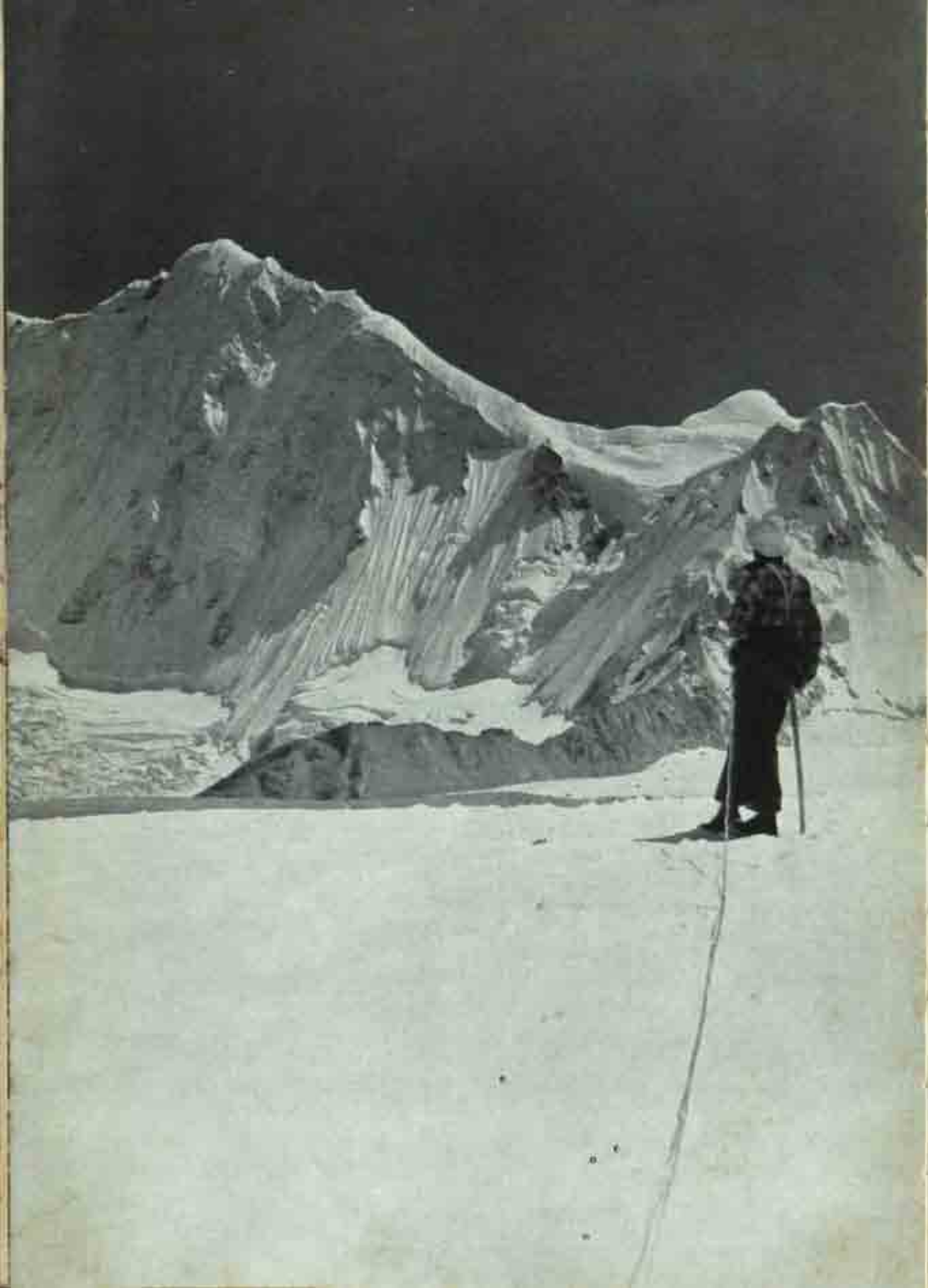
Plate 33: Southern aspect of Makalu (27,790 ft.) from the ascent from Barun to the col between Chamlang and Peak 6. South-east arête to the right crowned with the « Armchair », so-called from its concave shape.

Plate 34: South face of Makalu (27,790 ft.) with the south-east arête running off to the right. View taken from the Californian Base Camp on the Barun Glacier.









The following day he was better, but still very ill. All available Sherpas were brought up to Camp and on the 21st May he was carried down to Camp II, where he spent a much easier night; we noticed the quite extraordinary effect of the difference in altitude on the ease of his breathing. The following day he was carried over the very difficult moraine to Camp I on the Barun Glacier, where he rested until the 27th May, when he had very greatly recovered. It seemed that his broken ribs had damaged an area of lung which showed great weakness when he went to 22,000 ft. This caused rapid deterioration, and dehydration so serious that it upset his body chemistry. To complicate matters further, when in this low state of health the old symptoms of the malaria that he had contracted when in the Pacific Islands struck him, and was diagnosed as such by Evans when he was at Camp II. It was debated as to whether we had enough supplies and climbing strength to carry on for the week or ten days before the monsoon arrived. Tents and doctors were needed in lower camps and a reluctant decision was made to withdraw from trying to reach the North Col of Makalu.

Almost a month was involved with the two accident cases. The days of good weather and the food were running short. We still wanted a few days to complete the survey and climb at least one of the declared objectives of the expedition. Baruntse, 23,570 ft., was one of the peaks that had attracted us and this became the main objective of a party of four.

Arrangements had been completed to carry McFarlane to the Indian border, accompanied by the doctor, Michael Ball, with Wilkins and Hillary, who was now able to walk slowly. With every day Hillary gained in strength. This party set out on 29th May. McFarlane was carried with great care and skill by a team of men from Sedua village. The party was given every assistance from the local headmen and in less than three weeks McFarlane was transported to Calcutta and flown to New Zealand, where part of his hands and feet were amputated.

A few days before Hillary's party departed, Hardie, wishing to complete a survey at the head of the Barun Glacier, took a theodolite, and at the last moment Ball and Wilkins joined him for a few days climbing before their departure with the invalids. In a very few days, they were able to get in a great deal of climbing, their first peak being Pethangtse, 22,080 ft., which turned out to be much easier than it looked. Exciting views were had from the top; the Kangshung face of Everest stood clear from the South Col to well north, showing the full extent of the great north-east ridge of the mountain, on which the two "steps" which caused so much discussion in the expeditions of the 1920's and 1930's were clearly outlined.

Plate 35: Californian Camp III on the south-east arête of Makalu, looking west to Baruntse (23,570 ft.), over the moraine-covered Barun Glacier flowing to the left far below.

Plate 36: View from the south-east side trough of the Hongu Glacier of the Baruntse Massif (23,570 ft.), showing the long heavily corniced south arête, over which the summit was reached.

It would seem that both steps might be turned on the Kangshung face. In addition to two peaks of 21,500 ft., Ball, with one Sherpa, climbed an unnamed peak of 22,560 ft., which is the next peak north of Makalu II. This was a particularly fine rock climb on which Sherpa Urkien exclaimed in the English that he learnt extraordinarily quickly: "Urkien go up, but how he come down?"

Baruntse was climbed by a party of four—Todd, Harrow, Beaven and myself—which left the Base Camp in the Barun on the 26th May. The Barun Plateau was reached by a steep tributary glacier and the pass of about 20,000 ft. which was used for the first time in 1952; a camp was placed just below the saddle that leads to the Hongu Glacier.

This camp commands a glorious view of Makalu and Lhotse and the great peaks for many miles east and west. During the evening, when we had the most wonderful sunset, the Sherpas, who had carried the Rugby ball to all camps, kicked the ball about. On the 29th May, with four Sherpas, we carried a high camp to 22,000 ft. to a small col below Baruntse. The following day the four of us left camp at 6 a. m. and although the wind was very strong and gusty, the day was clear. The snow was soft and we made slow going over the first thousand feet, after which the ridge levelled out and we thought that the way to summit would be fairly easy. After traversing one or two snow bumps we were crossing a level corniced section just below a great lift in the ridge, when Beaven, who was forced nearer the edge by the steepness, thrust in his ice-axe to move to the next step that he had cut. As he did so, a fracture was caused by his ice-axe. A large section of ridge some two hundred feet long dropped away down the face. Beaven was left standing on the very brink while I, who was roped to him, leapt down the opposite slope, expecting to feel a jerk on the rope. He turned to me with a rather self-conscious grin and murmured something about "that was close" and made his way carefully back along the steps. We sat down further back, both considerably shaken. Todd and Harrow came up to us, not having seen the cornice break, and offered to take over the lead. Todd began cutting steps across an exceedingly steep face of snow. The next two rope lengths took him about one and a half hours. In turning a corner the slope required places for the hips as well as the feet. The day was now well advanced, and Beaven and I debated the wisdom of continuing. I was firmly of the opinion that they would not reach the summit that day, and argued that it was better to return the following day over the prepared ground and reach the summit with more time in hand. Beaven was in favour of going on and this we did for a short distance, and then, as the weather deteriorated and Todd shouted back that the way ahead was becoming increasingly difficult, Beaven and I turned and went back to camp.

Snow fell during the afternoon, and we estimated that the others would turn back, giving themselves enough time to reach camp before dark. Darkness

descended, but Todd and Harrow had not yet returned. We became very apprehensive as a storm of snow and wind was increasing, and with Mingma, I went out and climbed a few hundred feet above the camp shouting into the wind and flashing a torch. Great was our relief when we received an answer to our cry. The returning pair had lost the way and in their tiredness were despairing of ever finding the camp. Baruntse had been climbed; the summit was reached at 4.30 p.m., after a most exciting climb. Nothing was seen from the summit because of the swirling cloud, and they returned as fast as they possibly could, but found along the steep corniced ridge that the wind and snow had filled in the many hundreds of steps that they had cut on the ascent.

The following day, Todd and Harrow descended to the camp on the Barun Plateau. Beaven and I sat through a day of rather damp monsoon snowfall and on the 1st June we repeated the climb. Although we started earlier and reached the summit at half past two, our descent took much longer and we too did not get back till long after dark. The climb of the ridge is an ice-climb of very high technical difficulty, and it is a great pity that this superb climb was not crowned by an equally superb view from the summit.

Beyond the highest point that we had reached two days before, the climbing consisted of cutting eighteen rope lengths along an extraordinarily steep corniced ridge. This section took us three and a half hours and required the greatest concentration and finished with a very steep snow gully that we pidgeonholed. Once above this, all the technical difficulties were over and a long slog in deep snow was made to a rounded snow cone which we found to be the summit. Snow began falling and we had no view whatsoever. We descended to the steep snow gully and found the snow had deteriorated to a dangerously loose condition. The descent of the first three hundred feet took us one and a half hours. As with Todd and Harrow, all the steps of the ascent had been filled in and had to be scraped out or recut. If it had not been for the improvements in the high altitude boots that had been made on the experience that we had had on Everest, the climb could not have been done under the cold conditions. Although our feet were constantly in deep and icy steps and could not be kept warm by movement, they kept warm enough to stop fears of frostbite.

Darkness caught us as we descended the last of the difficult corniced ridge. We felt our way down the rest of the climb which, although quite difficult on the ascent, we found easy after the concentration needed for the ridge behind us. 800 ft. above the tent we were met by Annullu and Mingma, who had been left at the high camp on their own. When we did not return at dark, they set out on their own initiative to come and look for us.

A storm was blowing up and we were very thankful for their loyalty in coming out to meet us, despite the natural fear that Sherpas have of moving on the

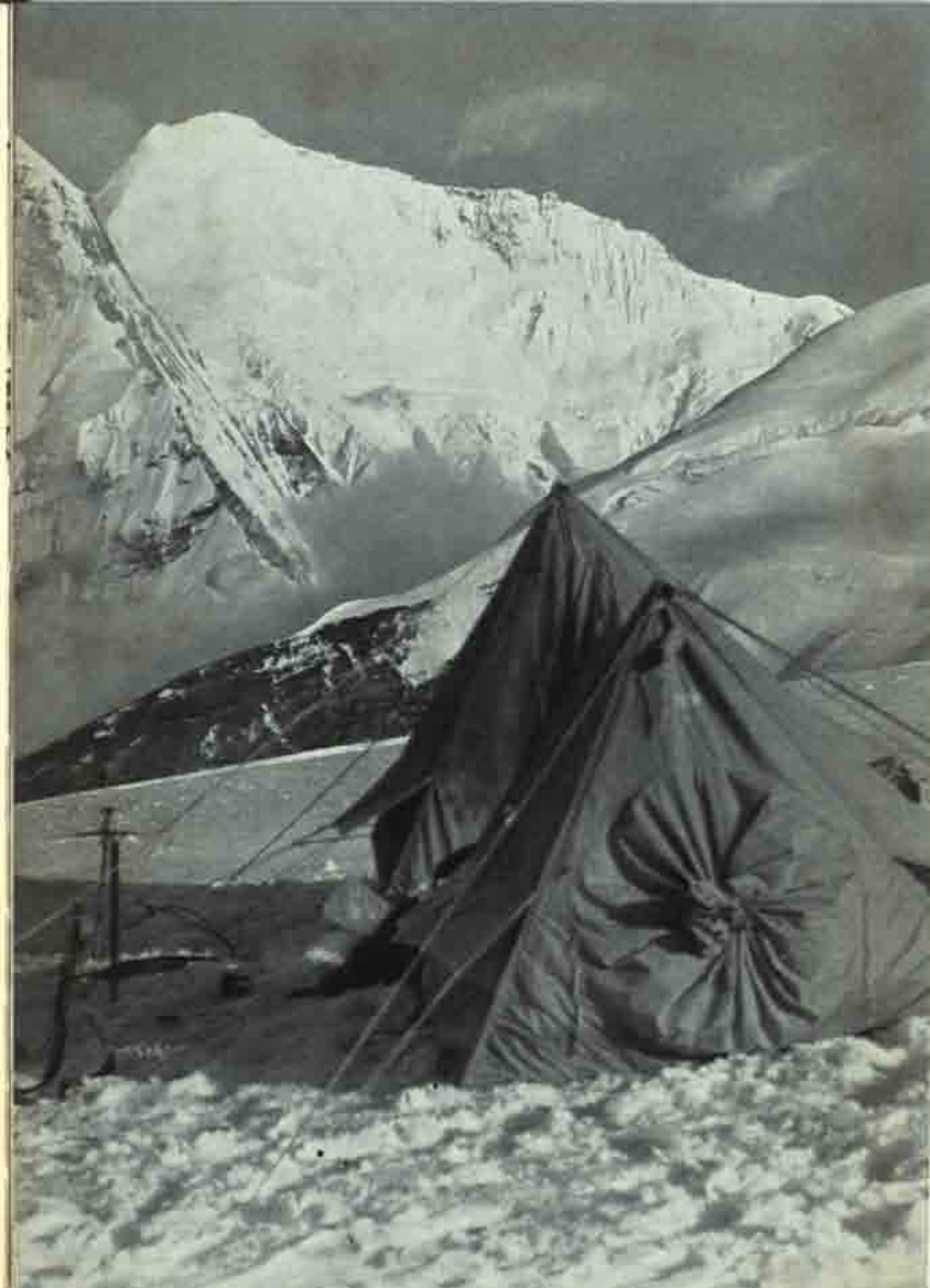
mountains in the dark. We were greatly relieved to see them, as they were to see us. They led us back to the tents and ministered to our few needs, which consisted merely of taking our boots off and helping us into our sleeping bags, where we slept for many hours.

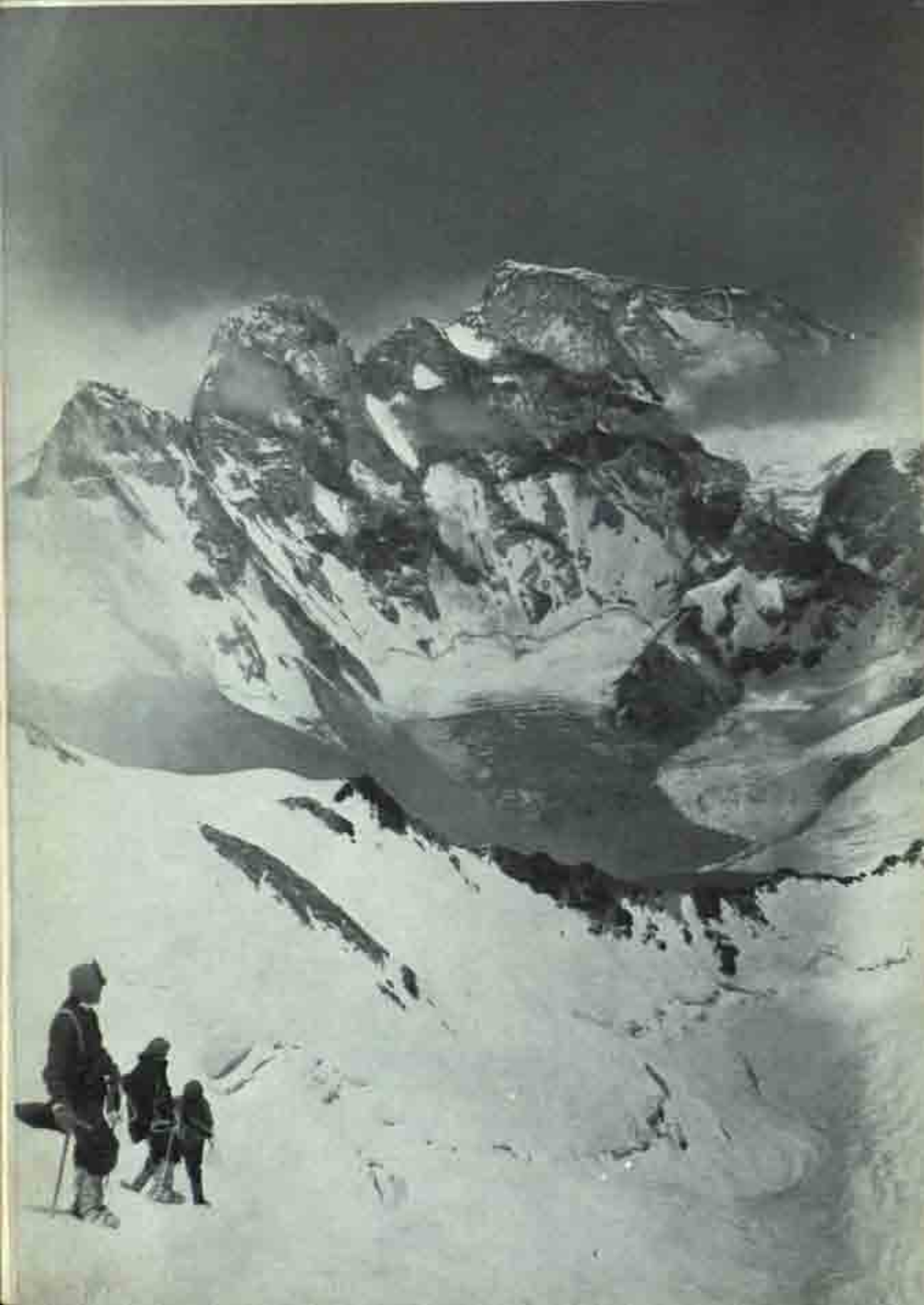
The following day we returned to our camp on the Barun Plateau. A heavy snowstorm had deposited eighteen inches of snow and by the look of the grey billows of monsoon cloud that were daily rolling up the valleys from the plains we knew that more was to follow.

Two days after climbing Baruntse, Charles Evans arrived at the camp on the Plateau Glacier with some seventeen Sherpas who were carrying the whole of the expedition baggage across the passes to Thyangboche monastery. A bleak wind whipped snow particles across the Plateau Glacier as the party trailed slowly up to our camp. Most of the Sherpas were clad in their home-made yak boots and their coats were thin, as they had been with us several months in the hot valleys. Several of the party were boys in their teens and included two girls of the same age, and it was interesting to see how matter of fact they were in accepting the biting cold and the headaches that they suffered at this altitude. Earlier that day Beaven, Harrow, Todd and I had prospected the top of the route down the steep 600 ft. of rock that is the only practicable way off the Plateau Glacier into the broad Hongu Valley. Ordinarily, with a small party it would be a touchy climb. It could be descended with care to avoid touching off loose rocks. Now, with driving snow, iced rocks and seventeen ill-shod, not-too-able Sherpas, it was a very difficult problem. We assembled 550 ft. of heavy manilla line and fixed this over all but 50 ft. of the whole descent. Most of the ropes we joined together in one long line and descended the rocks holding on to the rope, dislodging every loose or perched rock by sending them bounding and crashing down the abyss. We returned to the Plateau and assembled all the loads at the top of the slope. We then roped ourselves each to one of the ablest high altitude Sherpas and each worked a stage of about 120 ft. where we relayed the loads down, returning 120 ft. up in order to carry down again. In this way we shepherded most of the loads and all the Sherpas down to the flat glacier in the Hongu Valley, the whole operation taking two very busy days. On the third we double-packed to the Hongu Lake, which is near the foot of a pass which would take us over to the Imja Valley, from where it was an easy walk down valley to Thyangboche and the

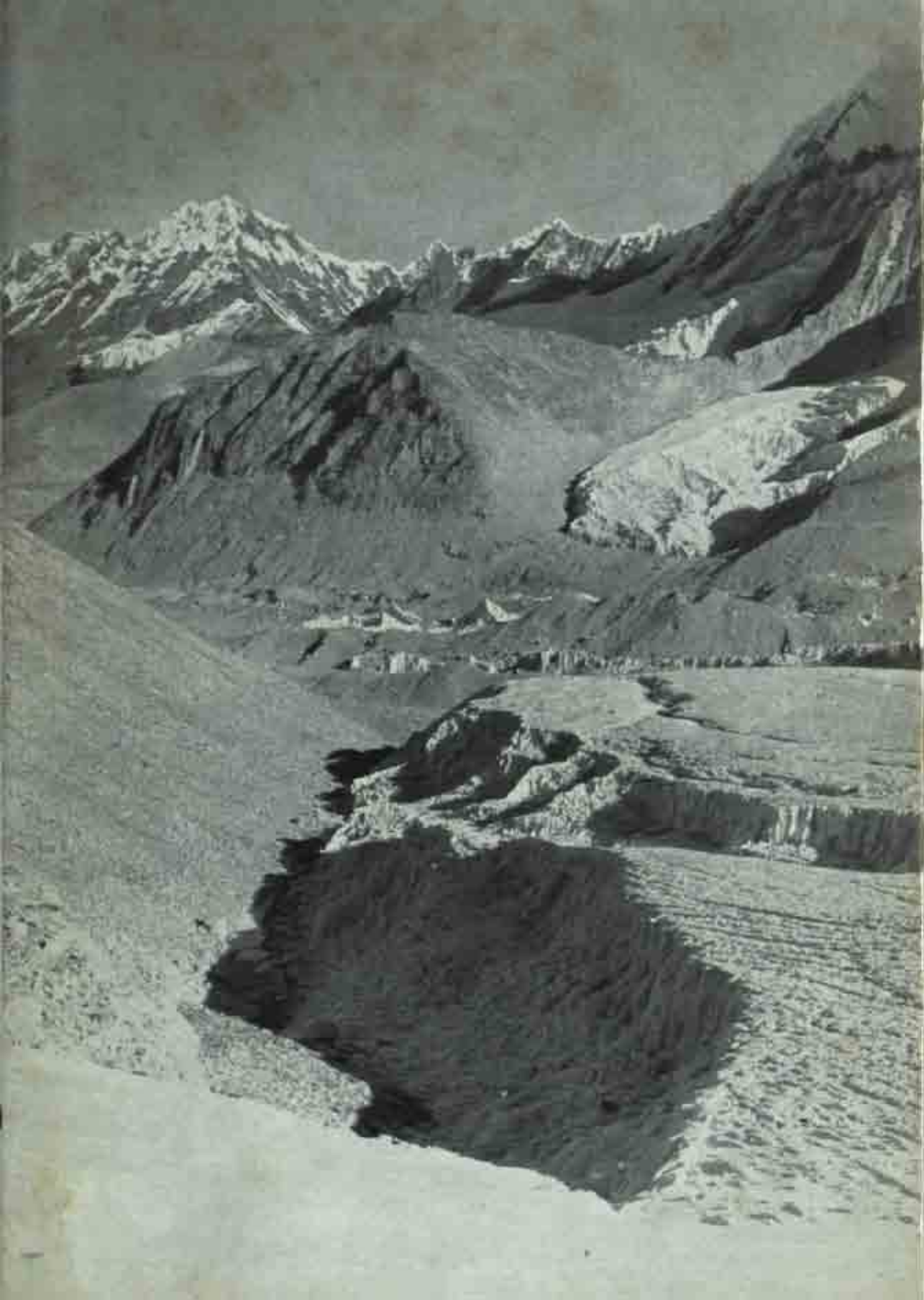
Plate 57: View of the Kangchung face of Everest from a high ramp in the upper nivé zone of the Barun Glacier. The long north-east ridge, with its two characteristic "steps", is visible in its entirety. To the left of the summit is seen the turret-like South Summit and the south-east ridge which was followed by the Expeditions of 1952 and 1953 from the South Col.

Plate 58: View of Chomo-Lingbo (29,380 ft.) from the south face of an un-named peak, P. 21,500 ft., to the east of Pethangtse.









Sherpa villages. This pass did not need the four of us. Harrow was elected to lead the band and get the main baggage over the top. Evans stayed on the Plateau with three Sherpas to complete some surveying. Todd and Beaven drew the most energetic straws—straws that sent them down the valley after yet one more peak, Nau Lekh, 21,455 ft., which they climbed on the 8th June, making the nineteenth twenty-thousand-foot peak for the expedition. The climb was fairly straightforward, and they were exceedingly fit and fast. They reached the summit along with the last clear view of the pre-monsoon time. In rain, snow and cloud they descended as the monsoon took over for the next few months. Nau Lekh was a great finish to the climbing and the exploring. It was the twenty-third ascent of the expedition and enabled a great deal of the survey to be tied together. And of course it also gave tempting views of still further blanks on the map that are yet to be surveyed.

At the same time as we were crossing the Plateau and the Hongu-Imja divides, Hardie was performing the most exciting feat of a direct crossing of the Barun-Imja watershed by a route that had been inspected several times by Shipton and others, and rejected because of its difficulty and danger. After climbing Pethangtse and several other peaks with Ball and Wilkins, Hardie left them to look for possible passes. In the search he visited three places and chose one wall of ice slightly less repellent than the others, and after climbing two more peaks, one called Cho Polu (22,030 ft.), he began the descent of the wall. The first 300 ft. from the crest of the pass was down a steep ice-slope, where Hardie had cut steps the day previously. With 200 ft. of nylon rope joined to doubled nylon tent cords, he was able to lower his three Sherpas and their loads down the slope to a platform he had cut in the ice. He then climbed down the steep stairway and anchored the rope to the ice-wall by two steel pitons. All this took some time, as did the search for the next line of descent. Hardie had with him Eric Shipton's photographs of the wall from lower down on the glacier, which did not show three long straight chutes of ice. Hardie could see these from above and one at least seemed to have a straight uniform route all the way across crevasses to the bottom of the slope. The chutes could have been caused by soft snow sliding down, so several detours were included to push at heaps of snow to see if they would avalanche. No avalanches could be started, and judging this safe enough, they chose the most likely and began the descent about noon. The three Sherpas were on 100 ft. of rope and Hardie was at the end of another 100 ft. In this way he

Plate 39: View of un-explored mountain ranges on the far side of the lower Hongu Khola, from the summit of Nau Lekh (21,422 ft.).

Plate 40: Glacier snouts disintegrating on their moraines in the Hongu Khola during a period of glacial retreat.

could clip a snap link on to the front man when steps had to be cut, or act as an anchor while they descended.

There were many obstacles and progress was slow, hastened a little when Aila dumped about fifteen pounds of tsampa. The worst obstacle was a yawning crevasse that could not be turned or bridged. By this time he was almost certain there was a route to the Imja floor; so, hammering in a steel piton, they lowered everything to the bottom lip, slid down the rope and so continued with the knowledge they could not now turn back. The ice-chute became steeper, with ice that required a great number of steps to be cut in the slope; but eventually the chute widened into a broad avalanche fan and the worst was over. At 7 p.m. they walked thankfully out onto the Imja Glacier and camped. On 8th June, Hardie met the main party coming over from the Hongu Valley and accompanied them to Thyangboche.

In the Hongu I still had two things in mind: first to cross the Mingbo Saddle, a very direct if difficult route to Thyangboche, and next to get to Sherpa land to see the whole of the annual bacchanalian ceremony of Dumji. The Sherpas had told us such a lot about the ceremony of Dumji that we all wished to attend, and as the week of celebration drew near, the anticipation caused an excitement which affected everybody.

The crossing of the Mingbo Saddle to Thyangboche was accomplished in two days. With me were Mingma and Onji Gyalbo, two very fine men from the village of Kundi, at which I was going to attend the weeks ceremonies of Dumji. The crossing was difficult, and for me a grand and exciting finish to the mountain part of the expedition. Snow conditions were rather extraordinary, and dangerous because the monsoon dampness caused soggy snow to avalanche in unexpected ways. On the second day we left the snow and descended a long valley, from rocks to mosses, from grass to shrubs, and finally down to trees and a yak herdsman's storehouse near the monastery. Khumbu is very beautiful, and like the Sherpas I felt it was like a home-coming too. Khumbu had the delights of the stomach, fresh potatoes, milk, curds and grain, and the delights of the eye, flowers and friendly green growth.

A few days later all parties were camped together near Thyangboche and for the next ten days we joined in the Sherpa celebration of Dumji; a sort of religious harvest festival, which had many exciting highlights. A great deal of ceremonial and communal dancing was performed. The festivities culminated in a ceremony at Thyangboche monastery when medals conferred by Her Majesty the Queen were presented to the Sherpas who carried on Everest in 1953.

On 20th June we took a touching and somewhat hilarious farewell from the wonderful people of Khumbu and seventeen days later reached Katmandu.

HIMALAYAN CHRONICLE 1954¹

By Marcel Kurz

MAKALU²

I.

In 1954 three expeditions set out to explore Makalu, the fifth highest mountain in the world (27,790 ft.) and its immediate surroundings. The first in the field were the Californians and it is owing to the kindness of Francis P. Farquhar that we are able here to print a shortened version of the account by the expedition's leader, Dr. William Siri of Berkeley, California.

The British Everest Expedition of 1921 made a reconnaissance of the north and north-west sides of the Makalu-Chomo Lönzo massif from the Kama Valley and in 1933 the Houston Expedition brought home some fine aerial photographs which were to have furnished the basis for a map in scale 1:50,000—unfortunately never published. In 1951 and 1952 Eric Shipton, Edmund Hillary, Charles Evans and George Lowe thoroughly reconnoitred the west and south-west sides of the mountain. The first attempts to climb it were made in 1954.

The "California Himalayan Expedition" of the Sierra Club consisted of ten members, the eight climbers of which had had experience in the Alps, North America and the Andes: W. Siri, Bruce Meyer, Allen Steck, Richard Houston, William Dunmire, Fritz Lippmann, William Long and William Unsoeld. There were also two scientists, the physiologist Prof. Nello Pace and the biologist Dr. Lawrence Swan. The outward route from railhead at Jogbani is too well known to need repetition. At Dharan the party met Sirdar Ang Tharke and his thirteen Sherpas. The expedition's baggage, amounting to 7½ tons, was carried up to the snow line by 250 local porters and 150 Solokhumbu porters to Base Camp. The River Arun was crossed at Num and the route thence climbed up to the ridge between Kasuwa Khola and Barun Khola. This ridge was crossed at a height of 12,100 ft. and the route dropped over 3000 ft. to the Barun Gorge. This gorge is very deep and narrow at this spot and normally cannot be penetrated,

¹ This is a shortened version of the original French version written for *The Mountain World*, 1955. It constitutes an account and critical appraisal of some 60 expeditions and is a continuation of the standard work.

² In Pierre Vittoz's opinion the name is a corruption of the Sanskrit *Maha-kala*, a nickname of the great Hindu god Shiva, based on his fierce and awe-inspiring nature. *Maha-kala* may have two possible meanings: Sanskrit experts translate it as "deity", whereas Tibetan literature is more inclined towards the expression "The Great Black One", which more suitably describes the huge rock bastion.

but at this time there was still a lot of avalanche snow present and so they were able to get through. Nevertheless, some sections proved extremely difficult and at one place it was necessary to erect fixed ropes, ladders and other artificial aids. This route, therefore, is not to be recommended. A longer but much more reliable route, well known to local shepherds, leads via Sedua and Kasuwa Khola, but the Barun Khola Ridge must be crossed much higher up. Above 10,000 ft. the Barun Khola has a broad and flat valley bottom with good cow tracks, and the shepherds live there during the monsoon.

Base Camp was set up on April 5th in the middle Barun at a height of 15,400 ft., about two miles from the foot of the south face of Makalu. A full five days were occupied in unpacking, preparing the high camps and training the Sherpas in rock climbing and rope technique, in which they were very deficient.

From the examination of old photographs of Makalu the north-north-west arête would appear to provide the best route. However there were no views available giving sufficient details of the south-east ridge and the east face, so that the choice of a route was still an open question. On April 11th two strong reconnaissance parties started out, each consisting of four climbers and four Sherpas. The first party went a few miles up the Barun Glacier and clambered up the scree slopes and ice-fields in the great basin lying between the north and north-west ridges of Makalu. There was little doubt that the saddle between Makalu I and Makalu II could be reached without much difficulty but the great step in the ridge above the saddle was certainly unclimbable. The route must therefore traverse out across the north face and thence lead up towards the summit over very steep slopes. The second party crossed two ribs over to the east face of Makalu and reported that there was no possibility of an ascent from that side.

Up to now the south-east arête had not been considered at all, but it had now been examined carefully and the conclusion reached that here was a practicable route, although some portions were extremely forbidding. It provided the shortest route from Base Camp, was easier than the north-north-west ridge from an organising point of view—ultra short wave and visual communication could be maintained with all camps—and it would be better protected against the prevailing wind at great heights. The only serious obstacle seemed to be above the saddle at about 21,300 ft., where it would be necessary to climb up the south face in order to rejoin the ridge some 2000 ft. higher up.

The attack on the south-east ridge began on April 18th with daily relays of two climbers and two Sherpas. The lower ice-fall was circumvented on the left and Camp I was erected at 16,400 ft. The next week the upper ice-fall was traversed and Camp II set up at 18,400 ft. At the same time Siri and Steck marked out a route up the steep glacier to the south-east Col (21,300 ft.). The party was now forced to withdraw to Base Camp owing to the onset of violent storms.

At about this time the New Zealand Expedition led by Sir Edmund Hillary made its appearance in the Barun Valley, and shortly afterwards James McFarlane fell down a crevasse and sustained severe frostbite. The Californians stood by to render assistance if required.

A fresh attempt on the ridge was not made until May 5th. Camp III was fully equipped with all necessary stores, a large snow cave serving as shelter and store-room. Attempts were made every day to reach the arête 2000 ft. higher up, but they were beaten back every time by a combination of bad weather, technical difficulties and frequent snow slides. Finally an ice-cave was dug in the steep flank at 22,000 ft., where Camp IV was established; on May 14th severe storms forced all the climbers down to Base Camp. Just about this time Hillary became ill while ascending the north-north-west ridge and the Californian Expedition remained at Base Camp in case help was needed. The mutual co-operation of both expeditions was always on an extremely friendly basis.

The last attempt on the south-east ridge began on May 19th. Once more both ropes endeavoured to advance Camp V on the ridge above the saddle, invariably in thick mist and continuous storms. In spite of everything, fixed ropes, pitons and a rope ladder were installed on steep rocks and ice-slopes leading to the ridge. On June 1st William Long and William Unsoeld, with the Sherpas Gombu, Mingma Tsering and Kipa, made the last onslaught before the monsoon broke. After two days of very hard climbing in very bad weather they succeeded in reaching the arête at 23,130 ft., where they established a camp. They even advanced a little further along the ridge but were driven back by storm and waist-deep snow. They reported that the route continued on a snow ledge along the south-east ridge without further difficulty. Given reasonable weather they could have attained a very great height within the course of a few days, but it was not possible to continue as the weather got steadily worse. The five climbers made a difficult descent to Camp III, for deep snow now covered Makalu. Next day the monsoon was in full blast, all camps had to be evacuated and everybody returned safe and sound to Base Camp.

In good weather the ascent of Makalu over the south-east arête would not appear to present extraordinary difficulties, and the Californians are of the opinion that it is a practicable route. Perhaps the north-north-west ridge is even better, but the difficulties to be encountered on the north face are not yet sufficiently known.

II.

George Lowe's first-hand report on page 97 gives us a survey of the whole activity of the New Zealand Barun Expedition of 1954. Only the Makalu phase of it will be briefly repeated here:

The accident to Jim McFarlane, and the injuries which Sir Edmund Hillary suffered as a result, made a change necessary. Bill Beaver, Charles Evans, Geoff Harrow, George Lowe and Colin Todd began an attack on the Makalu North Saddle. In this way they might be able perhaps to reach the Shoulder Peak, Makalu II (25,125 ft.) and from there examine the upper part of Makalu I (27,290 ft.). A side-glacier, which has been called the "Makalu Glacier", flows down to the main Barun Glacier from the western flank and the north-north-western ridge of Makalu. They went up this and pitched their Camp III at about 20,000 ft. From there Norman Hardie, Lowe and Todd reached a saddle (c. 21,500 ft.) due north of Makalu II and thus obtained a view into the glacier which flows out of the Makalu II-Chomo Lönzo region, therefore on the Tibetan side, to the Kangchung Glacier. Also they could see into the western flank of the Makalu glacier terraces, which provided an apparently easy approach to the North Saddle (24,312 ft.). The same day, Evans, Harrow and Beaver pitched Camp IV (c. 22,000 ft.) on these terraces.

On the following day Hardie and Lowe climbed a peak of about 22,000 ft. south of the Saddle at 21,500 ft., over a very steep ice ridge, and from there were able to examine the north—or more correctly, the north-west—ridge of Makalu II. This confirmed their first impression, that this ridge was not exactly the best approach to the mountain's summit. Meanwhile, Evans and Harrow attacked the natural route, namely, over the terraces towards the North Saddle. They went up a long steep channel of snow, broke out of the couloir to the right some 1000 ft. above Camp IV and found a suitable site for Camp V on a shoulder of snow.

Hillary and Wilkins had come up from the Base Camp, in order to participate in the work from then on. After sixteen rest days to heal his broken ribs, Hillary thought himself mountain-fit once more. Seven Sherpas brought provisions, pitons and rope, in order to make the steep pitch to the North Saddle safe. But on the ascent to Camp IV (c. 22,000 ft.) Hillary had trouble with his breathing.

The next day, Lowe and Wilkins went up the route explored by Evans and Harrow, and fixed 200 ft. of rope in the icy part of the couloir. On their return they found Hillary in a very bad way; he was coughing and vomiting. Also he got no rest that night and it was decided in the morning that they would all take him down to Camp III. It was no mere indisposition, but a serious illness, which had almost found a bad end.

So ended the British attack of 1954 on the North Saddle and Makalu II.

III.

The French planned a reconnaissance of Makalu in the autumn of 1954 and an assault on the mountain in the spring of 1955. These expeditions, which were planned by Lucien Devies, the organiser of the Annapurna Expedition, were

organised by *Fédération Française de la Montagne (F.F.M.)* and the French Alpine Club. The leader was the guide Jean Franco, for many years head of National School of Mountaineering in Chamonix. The other participants were five first class climbers: Jean Bouvier, Jean Couzy, Pierre Leroux, Guido Magnone, and Lionel Terray. The Abbé Pierre Bordet and Dr. Jean Rivolier went as geologist and M.O. respectively. Apart from reconnaissance and training it was the intention to try out improved oxygen apparatus.¹

The expedition left Joghani on August 23rd with the Nepalese student Dilli Bahadur Verma as liaison officer, Gyaltsen Norbu (No. 145; sole survivor of the Api disaster) as Sirdar, 11 Sherpas and 50 special Darjeeling porters. They had 6 tons of baggage. 116 local porters were engaged at Dharan, the end of the road. The outward march was rendered difficult and subject to delay owing to the monsoon and the swollen rivers.

Base Camp was established on September 15th at about 16,000 ft. on the right bank and close to the snout of the Barun Glacier, right at the foot of Makalu. Young Verma died here from pneumonia. During the acclimatisation period the following peaks were climbed:

Point 20,570 ft. outlier of the north-west ridge of Makalu, on the right bank of Horse Shoe Glacier² on September 26th.

Point 20,650 ft. outlier of the south-east ridge of Makalu, on September 26th.

Point 21,190 ft. between Barun and Plateau glaciers, on October 2nd.

Point 20,740 ft. to the north of the above, on October 3rd.

Point 22,190 ft. and Point 21,360 ft. to the south-east of Peak 39, on October 4th.

A peak of 22,048 ft. not marked on the R.G.S. map, immediately to the west of Makalu II, on October 4th.

Point 22,590 ft., $1\frac{3}{4}$ mile north-west of Makalu II, on October 9th.

Pethangtse (22,080 ft.), second ascent, on October 10th.

All the above heights are taken from the 1:50,000 map of the R.G.S.

It was confirmed as a result of these reconnaissances that the best approach to Makalu was over the lowest depression (24,300 ft.) between Makalu I and II. The party went up the Horse Shoe Glacier and established three camps on it: Camp I at 17,400 ft., close to the junction with the Barun Glacier, Camp II at 19,000 ft. and Camp III at 21,000 ft. Camp III was built up as Advanced Base Camp within ten days. Owing to the danger of avalanches it was a more difficult matter to find a suitable site for Camp IV (23,000 ft.). The Makalu Saddle (24,300 ft.) was reached on October 15th. Here Camp V was put up, but it was very exposed to the wind. Repeated attempts were made from October 18th to 26th to establish Camp VI higher up, but they were unsuccessful owing to storm and cold. Franco

¹ *Alpinisme*, 1955, p. 255; 1954, p. 86; 126, 171-172. *Montagne*, June 1954, p. 70-72; 1951, p. 4-19.

² This is just suggestion. Sirdar calls it "Cwm Glacier", Franco "Cirque N.W.".

and Terray, with Sirdar Gyaltsen Norbu and Pa Norbu, starting from Camp IV, climbed Makalu II (25,130 ft.) on October 22nd. On October 30th Couzy and Terray made a last assault on Makalu I from Camp V in a terrible storm, and got as high as 25,600 ft. The evacuation of the upper camps was begun on the same day and on November 2nd everybody was back at Base Camp.¹

In the meantime Abbé Bordet made a geological survey of the region between Barun and Solo Khumbu, concerning which nothing has yet been published. Our information is derived from a short report in the Christmas number 1954 of *Alpinisme*, which is very careful not to say anything about the possibilities of Makalu above Makalu Saddle. This omission is quite understandable at the present time. Taking all in all the French reconnaissance was an undoubted success.

It would be advisable to give another name to Point 7660 m (25,130 ft.), instead of Makalu II.

THE YALUNG SIDE OF KANGCHENJUNGA

Since Nepal opened her frontiers in 1949, the Yalung Glacier has become an excursion area for the visitors to Darjeeling. Mostly one goes over the Singalila ridge, the frontier between Sikkim and Nepal, because the classic route over Pemayangtse-Dzongtri runs across the "Inner Line". One thus reaches Tseram, close to the end of the Yalung Glacier, in nine days. Many expeditions have already used this highway, from Jacot-Guillarmod in 1905 to Kempe and Lewis in 1953 and 1954.

Kangchenjunga is probably the most difficult and most dangerous of all eight-thousanders. The reconnaissance of its south-western flank was suggested in 1953 by Gilmour Lewis, who accompanied Frey in 1951. The leader of the enterprise was John Kempe, a teacher in Hyderabad, who already had experience of the Himalayas. Although the Yalung side has been regarded as most unfavourable, Lewis had a firm belief in its possibilities. Three of the intended party had to abandon the plan, so that in 1953 Kempe and Lewis were left to themselves. They started from Darjeeling on April 23rd with 36 porters, of whom 23 were women, who proved very good. Mingma Gyaltsen was Sirdar. Mani Bhanjyang (6560 ft.) is reached by bus in one hour, and from there to Tanglu (10,050 ft.), the first of the three bungalows on the Singalila ridge, is 3½ hours on foot. In 1955 a jeep can be taken to a point halfway between Tanglu and Sandakp'u, and

¹ Everybody very actively participated in these reconnaissances, including all the best Sherpas: Sirdar Gyaltsen Norbu (145), Eika Namgyal (probably Yika Namgyal, 155), Pa Norbu (165), Tashi (?), Chibeten (probably Chuden Phunjo), Dawa Norbu (probably Da Norbu, 165). When will expedition leaders finally decide to make a note of the control numbers of their Sherpas?

in 1936 it will be possible to take it as far as Sandakp'u. From there it is six hours more to P'alut (11,798 ft.). After that, tents are required.

On the 7th day Kempe crossed the Dain La (Danp'ebir, Δ 15,195 ft., on the $\frac{1}{2}$ inch map) and spent the night in Gonpatong (Gopetang, c. 12,470 ft.). (Kempe appears not to have possessed the new $\frac{1}{2}$ -inch map.) After crossing the Chumbab La (Ch'ongpa La, 14,750 ft.) he arrived at Tseram on May 2nd. He says nothing about the Semo La (15,290 ft.), but he must have passed it on his way to camp in Zema p'u (c. 14,010 ft.). It was the same route as Frey used (*BW* 1952, p. 147). Kempe describes Tseram as a cave among pine trees, at the foot of the terminal moraine of the Yalung Glacier. The three huts in the clearing (12,500 ft.) had fallen down before 1951. Here the porters were paid off and sent back, except for the five best, who now carried the Base Camp to "Upper" Ramser (c. 14,440 ft.), $3\frac{1}{2}$ hours from Tseram. Meanwhile Sirdar Mingma took himself off to Khunza to buy a goat, 1000 eggs and some hens, while Kempe climbed a view point (17,000 ft.) opposite Ramser, in order to take a closer look at Boktoh (19,462 ft.).

Some days later he ascended with Lewis from an intermediate camp to a point at 18,000 ft. on the east side of Boktoh. There they gave up. The southern and western ridges of Boktoh are in his opinion to be preferred.¹

On May 14th they traversed the Yalung Glacier and the next day occupied themselves with Koktang (on the Kurz map, 6398 m. = 20,992 ft.; on the $\frac{1}{2}$ -inch map, 20,166 ft.), but did not succeed in reaching the top.² The return to Ramser was followed by a new start, with a view to reconnoitring the west face of Kabru, but it proved too difficult and dangerous. On May 23rd, while leading, Kempe plunged some 15 ft. into a crevasse, but without serious hurt, whereupon they set up Camp III below an icefall at 20,100 ft. On May 24th they climbed up through this icefall and pitched their highest camp (IV) at 22,700 ft. It was a wretched night, icy and windy, and three of them were crowded together in a small tent.

Talung Peak (24,112 ft.) was on the programme for the next day, but they were separated from it by a precipice, and so they climbed instead direct to the top of the main ridge in two hours; along this ridge runs the frontier between Sikkim and Nepal. From it they had a view down upon the Talung Glacier. The aneroid showed 24,000 ft. It would have been easily possible to follow the snow ridge southwards and establish once and for all whether P. 7388 (24,240 ft.) really existed. (See *BW*, 1951, pp. 260-262.) However, as Kempe feared that a snow-bridge over a large crevasse might collapse, they set out at once on the return by the ascent route. Still, this climb of May 24th, in brilliant weather, is the most

¹ Boktoh and the whole ridge that connects it with Jannu are badly represented on all maps up till now. It is more difficult than the map shows, and has defied all attacks to date.

² J.W.R. Kempe: *The Yalung Valley*, 1951. *A.J.*, 119, pp. 326-327.

important and most interesting that has been done up till now in the upper Yalung basin.

They turned back to Ramser, crossed the Ratong La and arrived in three days at Dzongri. For the return journey they used the classic route via Pemayangtse.

On April 10th, 1954, Kempe appeared again as leader of a new expedition, this time with the purpose of finding the route on the Yalung Flank of Kangchenjunga.¹ His companions were G. Lewis, T.H. Braham, Dr. D.S. Matthews, S.R. Jackson and Jack Tucker.

With a view to the projected 1955 expedition, Kempe first debated between the three possible approaches to the Yalung Glacier in March:

a) Pemayangtse-Dzongri-Ratong La (17,050 ft.). At this time of the year the pass is still deep in snow, but as far as Yoksam one can live off the land.

b) From Pemayangtse through the valley of the Rimbi Chu and first by way of Danp'ebir (Δ 15,195 ft.) on to the Singalila Ridge.

c) From Darjeeling as far as the P'alut bungalow on the classic route, then on the Nepalese side via Khebang-Yamp'odin and over a saddle near the Semo La to Tseram.

This is the route that Kempe recommends. It has the advantage of passing through villages where provisions can be bought. Kempe reckoned a total of twelve days from Darjeeling to Base Camp. This was erected at the end of April on the upper Yalung Glacier between the median moraines, a fair distance below Paches Grave (18,700 ft. according to Jacot-Guillarmod). It had to be moved twice situated between 16,400 and 18,000 ft. on account of avalanches; they are especially frequent in May, sometimes every ten minutes.

It was now a question of reaching the huge glacier terrace which runs slantwise through the south-west wall of Kangchenjunga and ends in the famous horseshoe that is seen so well from Darjeeling. Three itineraries were considered, all of them dangerous:

a) Over Pache's Grave and the snow slopes which lead to the upper part of the snow shelf. This is the Jacot-Guillarmod route of 1905. But the reconnaissance was not pushed forward over Pache's Grave.

b) A constricted side glacier, very broken in its lower part, leads to the foot of the Talung Saddle (21,933 ft.), the deepest gap between Kabru and Kangchenjunga. From this glacier one can climb to the left, northwards, over a steep slope to a snow ridge which reaches of the lower (south) end the great snow terrace at about 22,300 ft. Frequent attempts were made, one of them to the foot of the Talung Saddle, but in the end this route was abandoned as too dangerous.

¹ John Kempe: Kangchenjunga Reconnaissance, 1954. *A.J.* 36, pp. 427-31.

c) The central icefall was begun several times despite its frightening appearance, once by its right bank along the foot of the precipitous rock wall, once by its left side on an occasionally outcropping rock rib. This seemed the least dangerous route, if one keeps as much as possible to the rocks, where ropes were fixed. A night's camp was made at the top of these rocks at between 20,000 and 21,000 ft. But the glacier above proved so broken that this route too was abandoned 500 ft. below the great snow shelf.

Some days later a new inspection was made on the occasion of an attempt on Talung Peak and this was given preference for 1955. But Kempe seems to be very optimistic about the upper part of the climb: as far as one can see from all the pictures, the famous snow shelf leads to the great horseshoe, and from there one can only reach the west ridge, 1 km. from the main summit, by a very steep and dangerous couloir. The future will tell!

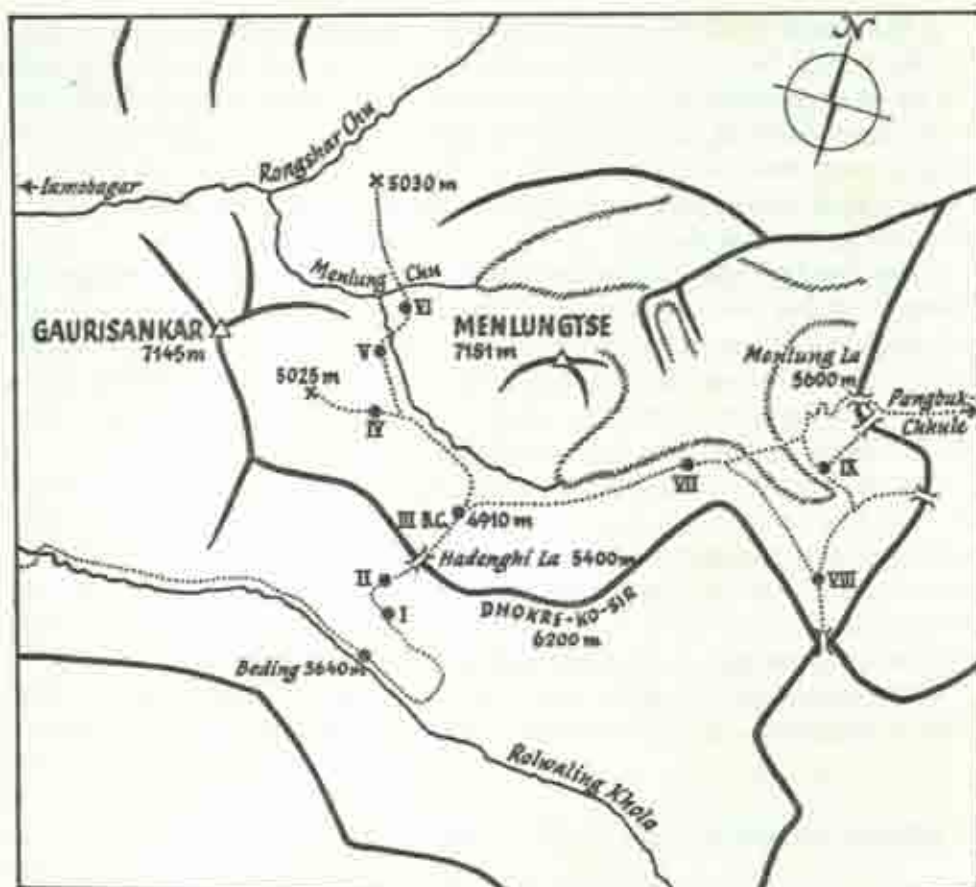
Kempe says very little about his renewed attack on Talung Peak. He used the 1955 itinerary to the region of Camp I (20,000 ft.), then crossed to the left (eastwards) under the séracs to the deeply cut ice-cleft which leads to Col 22,870 ft. But for lack of time Kempe did not push on to this saddle. It is doubtless the easiest route to Talung Peak. It would also be very interesting to connect the 1953 route with the traverse of the whole frontier ridge as far as Kabru.

At the beginning of June the expedition turned back for Darjeeling. One can follow with intense interest the results of the new attacks on Kangchenjunga.

FROM GAURISANKAR TO THE NANGPA LA

According to information which we received from Jean Juge, permission was not obtained from the Nepal Government for a Gaurisankar Expedition until June 18th 1954. As is well known, Gaurisankar (23,435 ft.) has for long been considered as equal to Everest and is world famous for that reason; actually, however, it is nearly 40 miles west of that mountain and more than 5500 ft. lower. Raymond Lambert (Geneva) was leader of the expedition and the other members were as follows: Mme. Claude Kogan (Nice), Denis Bertholet, photographer (Chamby-sur-Montreux), Jean Juge (Geneva) and Dr. Franz Lochmatter, M.O. and mountain guide (St. Niklaus). There was also an independant scientific party consisting of Albert Zimmermann, botanist (Geneva), and his assistant Marc Stengelin (Geneva). Dawa Thondup (No. 49) was Sirdar of the six Sherpas, also Koch Thundu (No. 154). Two-thirds of the 100 porters were allotted to the climbing party and one third to the scientific group.

The expedition left Kathmandu on September 5th, utilising the well-known Everest route via Bhadgaon, Banepa, Dolalghat and Charikot as far as Dolakha.



At this point the party turned left to the north-east and gained the Rolwaling Valley via Thari and Simigaon, passing through Ramding to reach Beding (11,940 ft.) on September 16th. This small village has a lamasery and is situated at the south foot of the Gaurisankar range. The Kathmandu porters had to be paid off and dismissed here and it was only with great difficulty that we succeeded

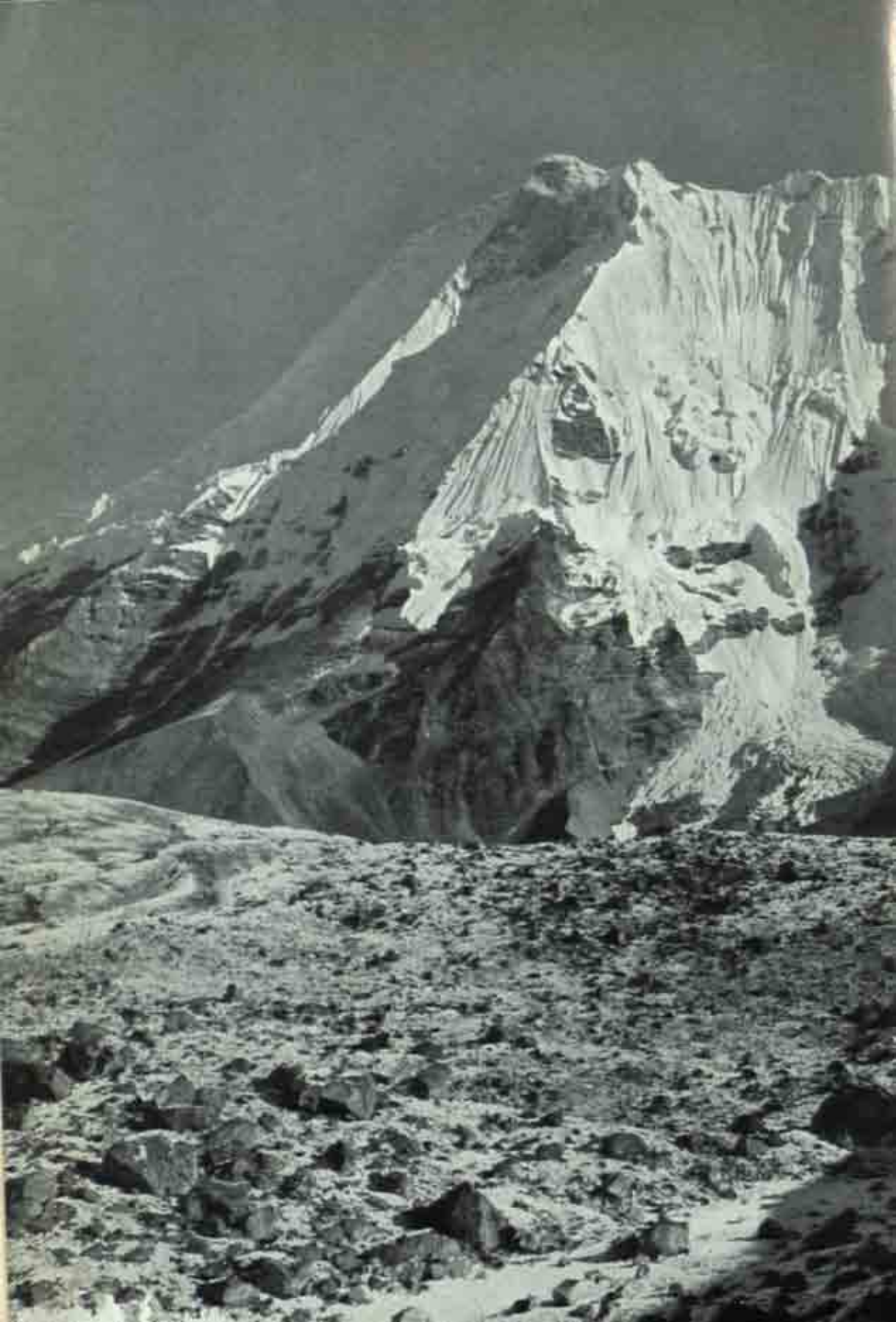
Plate 41: South face of Gaurisankar (23,433 ft.). In the fore-ground, in the centre of the photograph, an imposing peak called Tseringma by the local inhabitants.

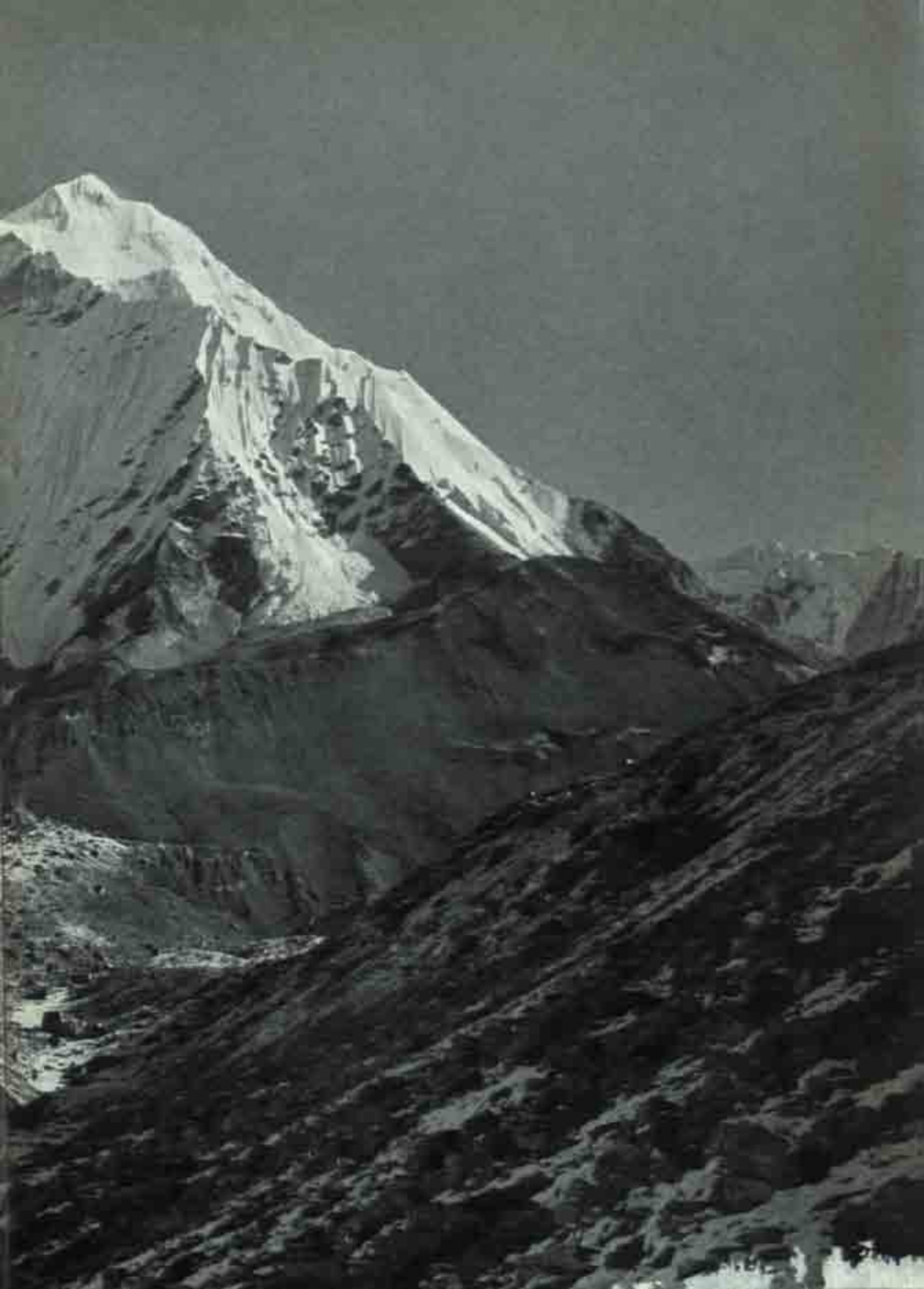
Double-plate 42/43: South face of Menlungtse (23,550 ft.) from Base Camp on Gaurisankar-Pokhari (16,105 ft.).

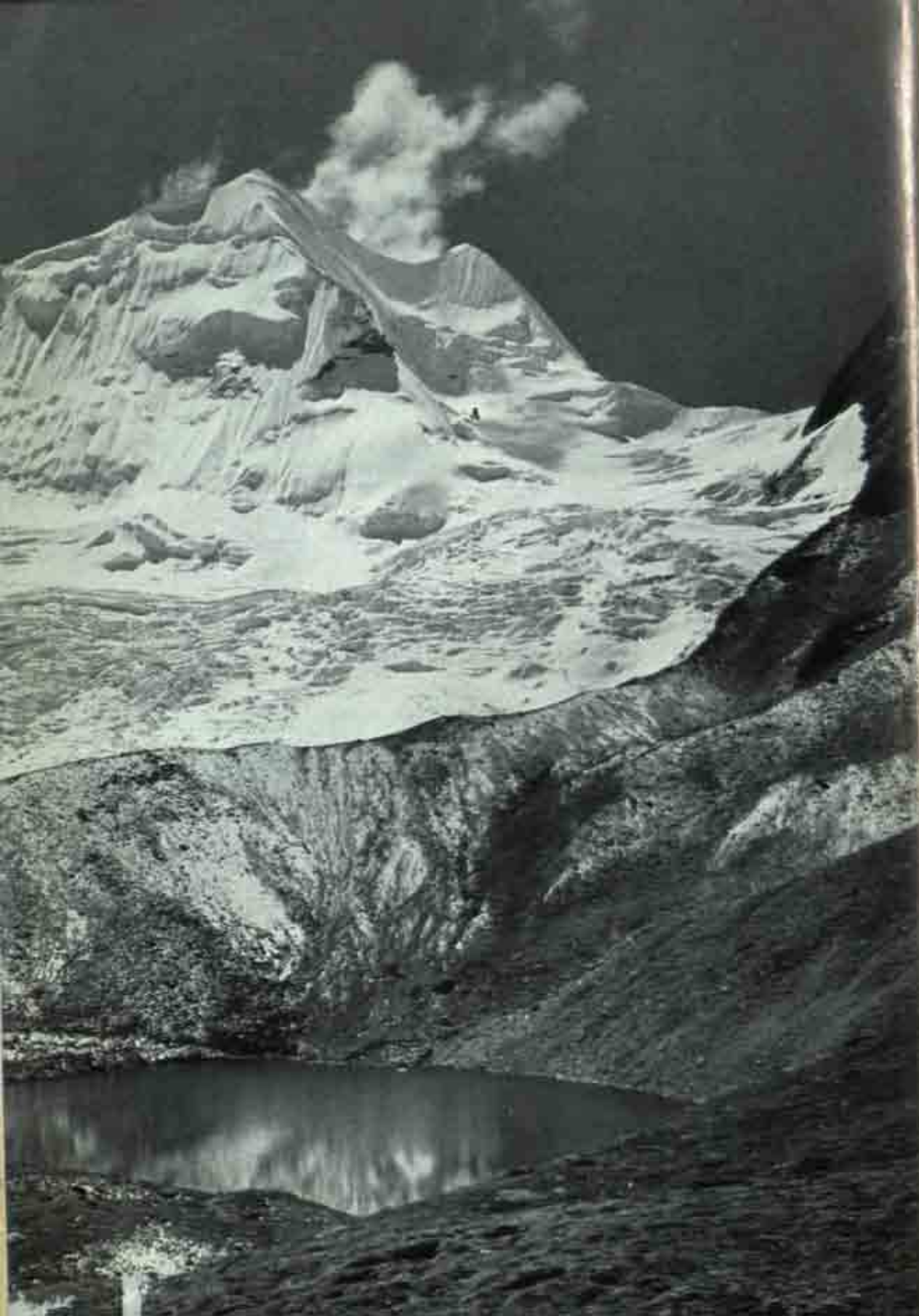
Plate 44: West summit of Dhokre-Ko-Sir (20,335 ft.), immediately above the Hadenghi La (17,510 ft.), the pass connecting the Rolwaling Khola with the beautifully situated Gaurisankar-Pokhari (16,105 ft.), in the foreground.

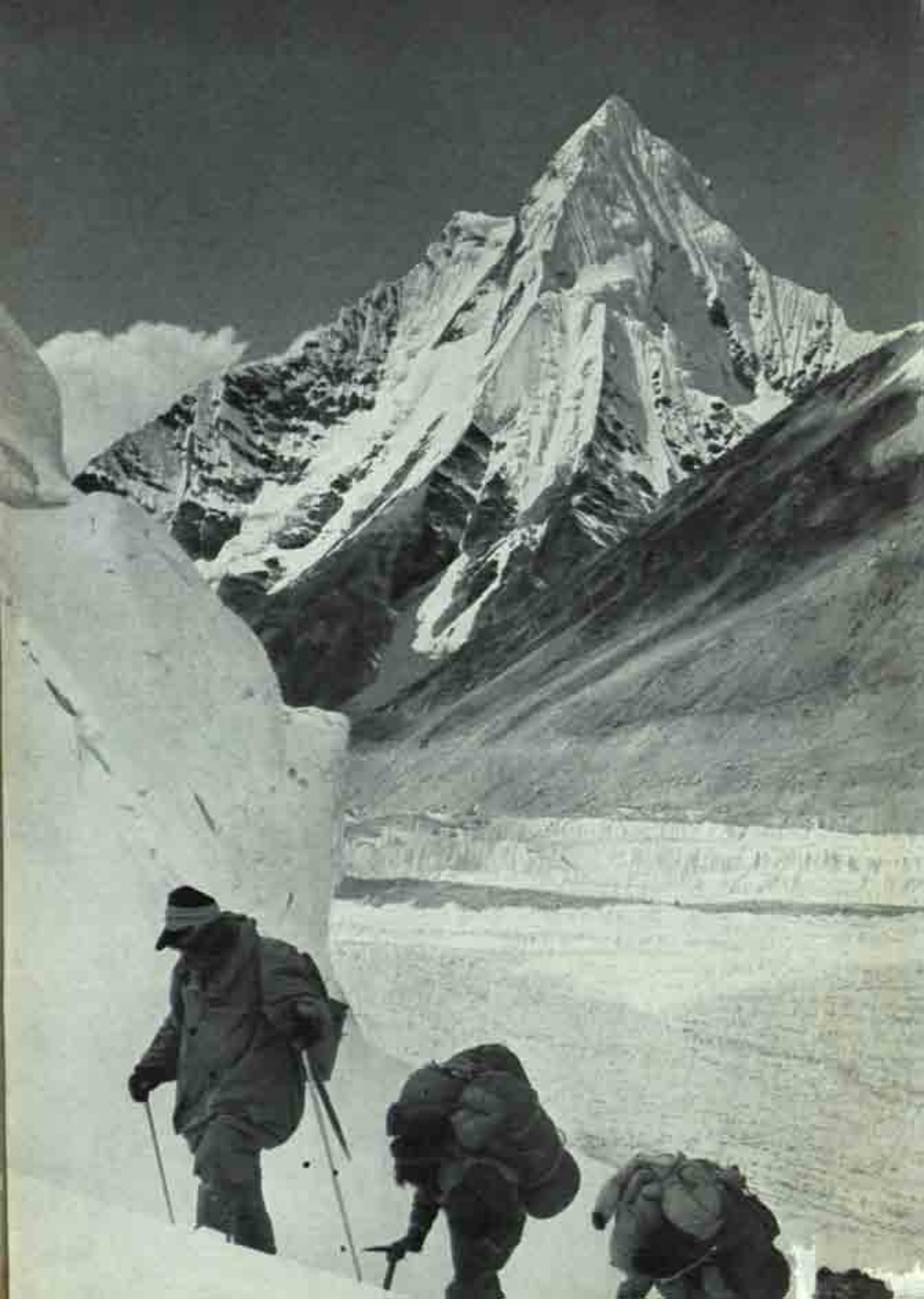
Plate 45: East face of Menlungtse (23,555 ft.), seen from a height of 17,055 ft., on the way up to the Menlung La (19,370 ft.).

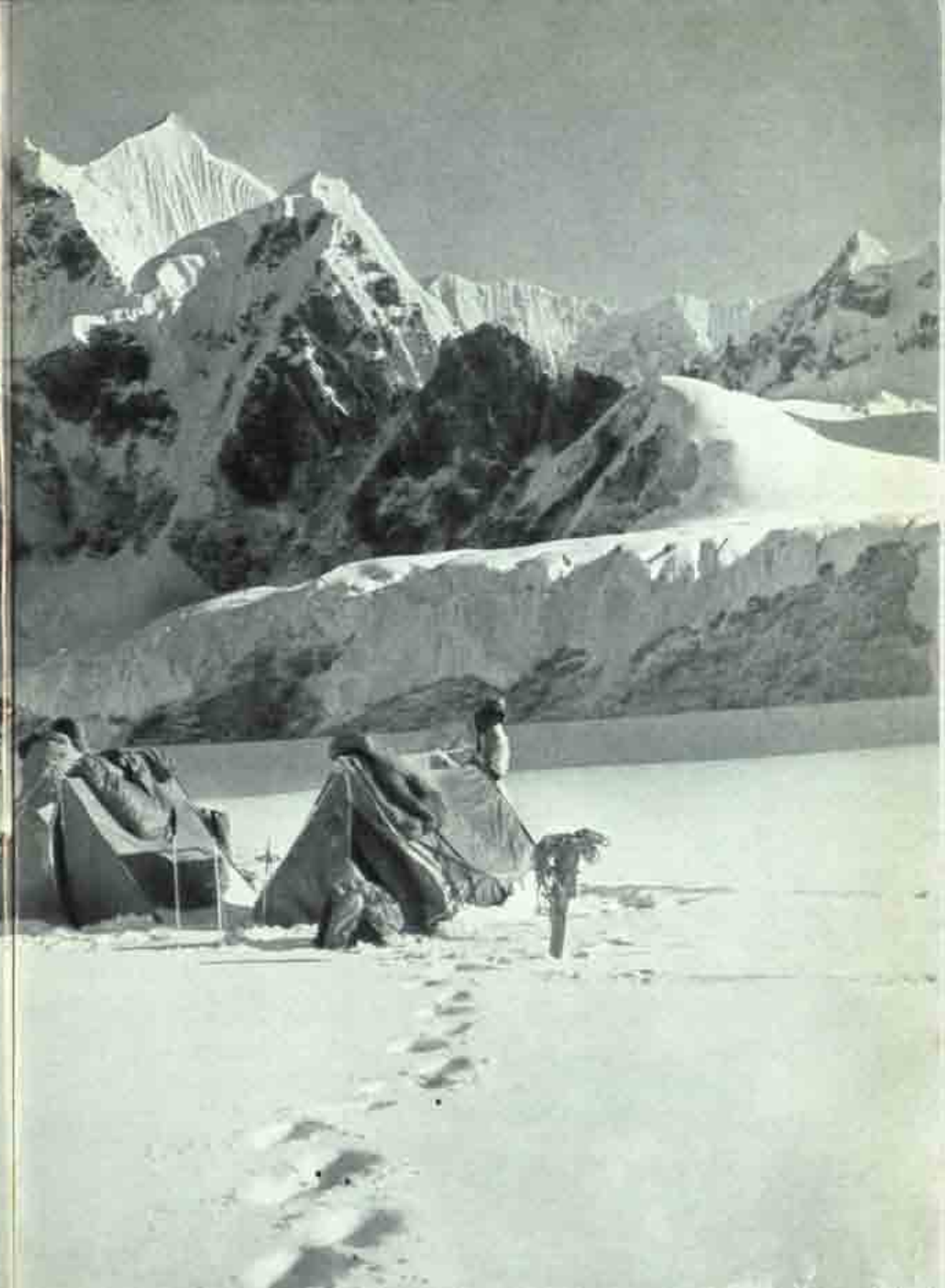
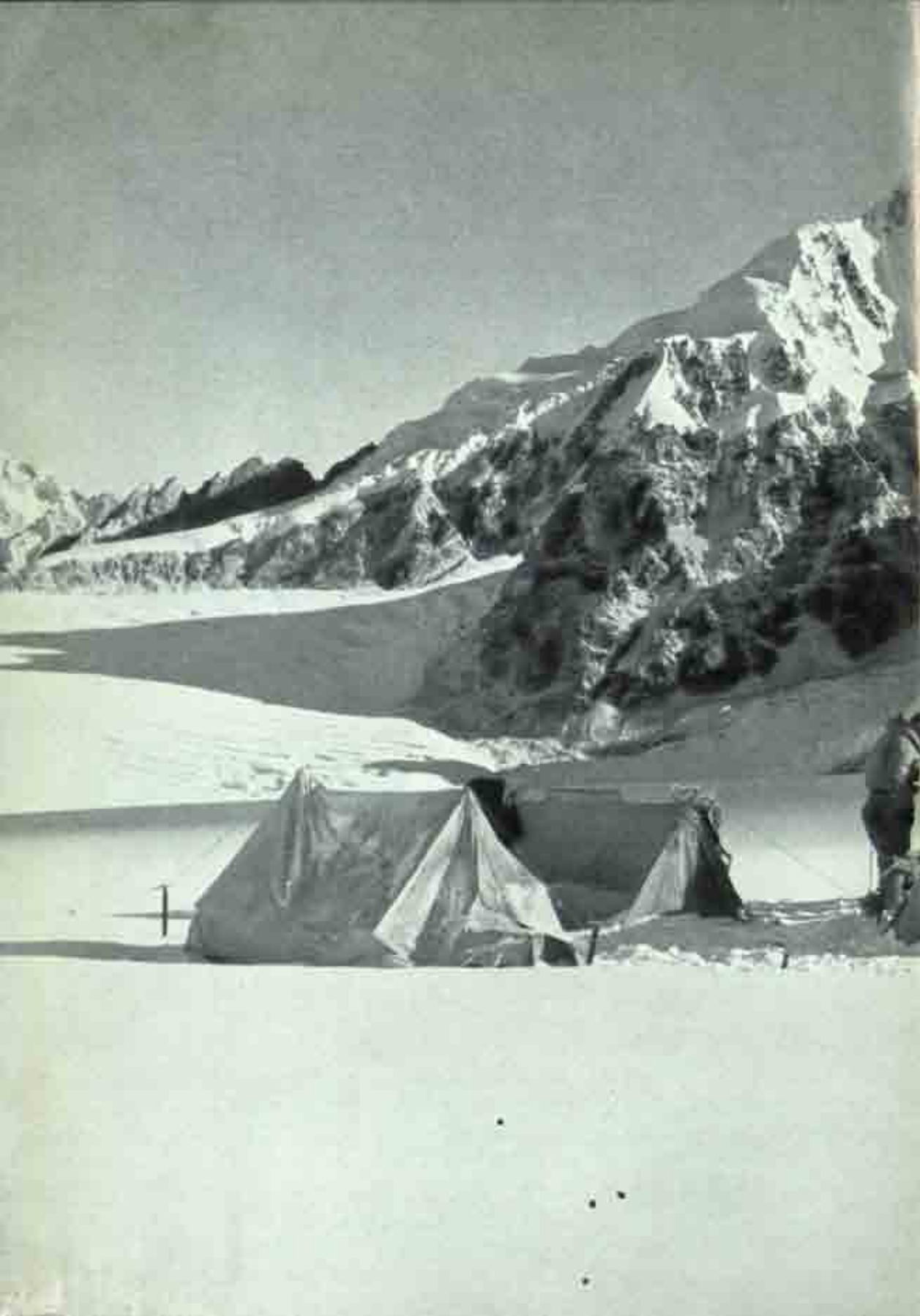


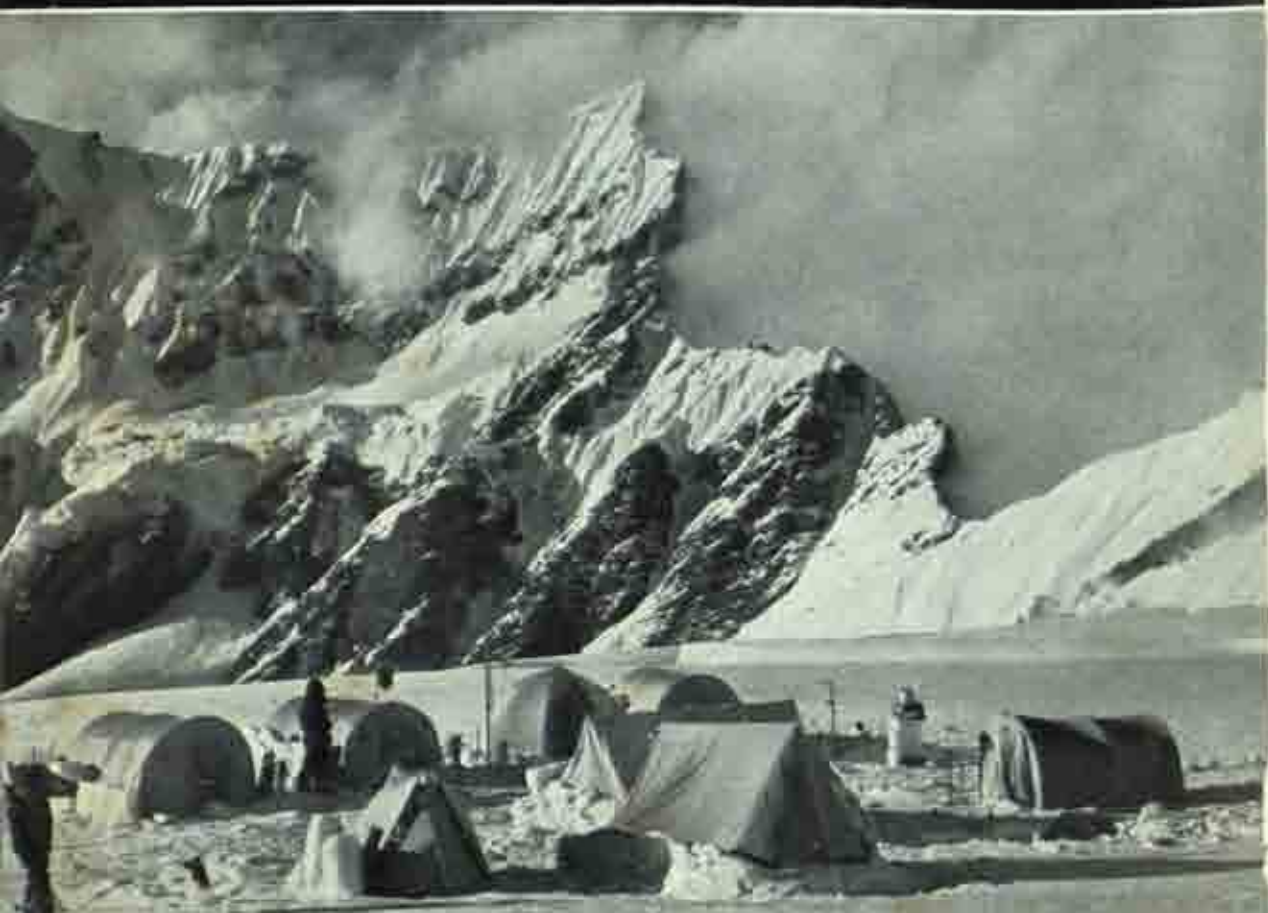












in assembling a minimum of 50 local porters, including men and women of all ages, their leader indeed being a lama! Two intermediate camps at 14,100 ft. and 16,300 ft. were necessary before the ridge between the Rolwaling Khola and the Menlung Basin was crossed by the Hadenghi La (about 17,100 ft.). Base Camp was set up at 16,100 ft., by a small lake, 2-2½ miles south-east of Gaurisankar (23,455 ft.) and 1¼-2 miles south-west of Menlungtse (23,555 ft.).

While the main body followed, bringing forward the baggage in shuttle service, several reconnaissances were made. Lambert and Lochmatter pronounced the lower part of the east ridge of Gaurisankar as practicable, but very narrow and beset with ferocious ice-pinnacles above 6000 m. (19,680 ft.). Mme Kogan and Lambert made a careful examination of the north-east face and the north arête from a view-point north-west of Menlungtse, which gave out little hope, as the whole face is broken up by steep precipices. Juge and Lochmatter with two Sherpas went off to find a way into the valley of the Bhote Kosi over the Menlung La or some other pass. At this point the lama intervened to say that, owing to some religious festival or other, no inhabitant of the Rolwaling Valley could work as a porter for the next ten days. The only way we could counter this interdiction was by sending two Sherpas over the Tesi Lapcha to Thami (near Namche Bazar) to recruit 100 porters from Solo Khumbu, but this would take at least eight days. In the meantime the search for the Menlung La proved fruitless, for as yet there was no reliable map of the district and Shipton's description was a little vague.

As the very steep and avalanche-swept south side of Gaurisankar was not a practicable proposition, the north-west ridge which descends to the Rongshar Valley came into the picture but its reconnaissance would have taken too long, as it was already the end of September. The highest point of the range, the very steep and probably unclimbable Menlungtse (23,555 ft.) was quite out of the question, so it was decided to cross the Menlung La into the Bhote Kosi Valley, traverse the Nangpa La and erect a new Base Camp at the foot of Cho Oyu, "permission for which had been received in Kathmandu. There was actually an Austrian party already there but we had spoken to them before we left Kathmandu and they said that they intended to explore the access to the mountain".

Double-plate 46/47: View from the camp (17,875 ft.), at the foot of the south-east (false) Menlung La into unsurveyed territory to the north and east of Menlungtse (23,555 ft.). In the centre of the picture is a magnificent un-named peak and to the left is a glimpse of a glacier stream flowing into the Menlung Chu. To the right can be seen the new plateau which is reached via the partly sunlit glacier terrace. From this plateau the northern (proper) Menlung La (18,570 ft.) is said to be accessible. There would appear to be some discrepancy between this splendid panorama and the sketch map as regards the firm lines of the glacier snout.

Plate 48: Above: View from the Base Camp on the Torongampa Glacier of the savage Nepalese-Tibetan frontier ridge of the Ganesh Himal. Below: View of Lumpu (22,190 ft.) from Camp II, close to the frontier crossing to the north. See page 129.

On October 2nd Juge measured out a base of 400 m. (1310 ft.) from the ends of which Bertholet made a complete panorama (360°). Although this is not equivalent to a photogrammetric survey, it sufficed to correct the present completely erroneous topography of the Menlung Basin.

The advance party set off for the Menlung La on October 3rd. The next day they were surprised by a severe storm, the same one which wrought havoc with the Tichy expedition on Cho Oyu. On October 5th Mme. Kogan and Lambert reached a rocky col above Pangbuk at about 18,370 ft., but the descent on the east side would have been too difficult for porters. At last on October 6th they found the best crossing further to the north, Shipton's Menlung La (18,370 ft.). On the west side enormous crevasses split the glacier and on the east side one had to cope with a steep rock face of 1,300 ft.

On the evening of the same day the porters from Thami arrived at the "Lake Camp" (Gaurisankar Base Camp). Before long, news was received from Lambert and the rest of the party moved off, with 80 porters wearing only Tibetan boots and carrying 30 kg. (66 lbs.) each. The crossing of the Menlung La was therefore a serious operation and everyone was very pleased when all arrived safely at Chule on October 9th, where the well-known caravan route to the Nangpa La was joined.

DHAULAGIRI

"The White Mountain", the highest wholly Nepalese summit (26,812 ft.) was first photographed from close up in Autumn, 1949; this was Arnold Heim's air picture (*BW* 1950). In Spring 1950 there followed the French expedition's exploration; it was defeated on the east face of the mountain, but at least it was able to take a first look at the north flank from the "Col des Français" (*BW* 1951). Important pioneering was done by the AACZ expedition in 1953 (*MW* 1954), which worked its way up through the hitherto quite unknown gorge of the upper Mayangdi Khola, climbed up through the northern girdle of precipices on to the upper glacier terrace, pushed on over the "Pear" to 25,250 ft. and also reconnoitred the Northeast Col (18,538 ft.) and the South Saddle.

The large Argentine expedition of 1954, called the "President Peron", stood on the shoulders of the Swiss. Lt. F.G. Ibañez was organiser and leader; he was one of the best known of Andean climbers. The other climbers were: D. Bertonecelj, the Chilean R. Busquets, F.A. Godoy, F. Grajales, Dr. A.E. Magnani and the Tirolean-born Gerhard Watzl. The doctor was A.R. Beramendi; the manager of the upper camps, H. Benavidez; radio-operator, M.A. Gil; camera-man, J. Iñarra-Iraegui. 14 Sherpas went with the 11 Sahibs; the famous Pasang Dawa Lama was Sirdar.

According to the report kindly given us by A. E. Magnani, the expedition left beautifully situated Pokhara—which they had reached by air—on March 15th, 1954, with 15 tons (!) of baggage, which was taken to Beni by mules in four days. From there 400 porters were used and Muri was reached in five days' march. There the coolies were paid off and new ones had to be recruited. The expedition now followed exactly the previous year's approach route through the upper Mayangdi Khola, and on April 4th. arrived at the Base Camp (11,800 ft.), at the same spot as 1953. Here almost all the porters were dismissed, except for 17, who with the Sherpas and Sahibs moved the loads in a shuttle service up to Camp I (15,100 ft.). While Camps II (16,400 ft.), III (18,000 ft.) and IV (19,700 ft.) were pushed forward up the Swiss route, a group advanced to the Col des Français (16,730 ft.). Then Camp V was put up in the precipice at 21,300 ft.; a crevasse served for access. For Camp VI (23,600 ft.), at the upper end of the "Pear", a platform for two tents had to be blasted among limestone slabs lying like roof-tiles. This cost Sergeant Godoy, assisted by Bertoneclj, three days of difficult and dangerous mining with 28 explosions.

Nevertheless, it is not quite clear how it is that the assault on the summit only began on May 30th. On that day four Argentinians and five Sherpas climbed up through a rock and snow chimney to about 25,000 ft. and there with some difficulty erected Camp VII at the foot of the steep pitch that blocks access to the main ridge. After a bad night Bertoneclj and three Sherpas, who had suffered slight frostbite, returned to Camp VI. Ibañez also had frostbite, but wished to remain at Camp VII while the summit party made the final assault. This consisted of two ropes: Watzl with Pasang Dawa Lama, and Magnani with Ang Nyima (the brother of Pasang). They overcame the wall and emerged on the west ridge, but encountered such difficulties there that they had to move out on to the ledges of the almost snowless south face. On this climb Watzl used the oxygen apparatus. Not until 5.00 p.m. were they again on the main ridge, at about 26,250 ft., where they had to dig a cave in the snow for a bivouac—without sleeping bags or supplementary clothing. It was a very bad night, with continuous snow. Instead of being able the next morning go on to the summit (26,812 ft.), for which they had reckoned only two to three hours, they fought their way down to Camp VII (25,000 ft.) in deep new snow; twice they had to rope down 150 feet. On this fantastic descent Ang Nyima fell and Magnani was able to hold him only with difficulty. Pasang Dawa Lama, who once again put up a splendid performance, and Watzl rescued him. Ang Nyima suffered a deep wound on his forehead and a bruised chest. It was not easy to get him down to Camp VII, where Ibañez was waiting.

On June 3rd Watzl and Pasang Dawa Lama set to work to move Ang Nyima down to Camp VI (23,600 ft.). Magnani started out with Ibañez shortly afterwards, but the latter had lost his crampons, which made the descent difficult and occasion-

ally rather dramatic; but in the end they happily reached Camp VI. Ibañez stayed there, while awaiting a pair of crampons that were to be sent up from Camp V (21,300 ft.). Meanwhile, the others combined forces to transport Ang Nyima to Camp IV (19,700 ft.) where the doctor awaited him.

The next day two Sherpas went up to Camp VI, but Ibañez was no longer able to put on the crampons that were brought for him. His feet were so badly frostbitten that he could go no further. A rescue party was immediately organised: Dr. Beramendi, Busquets and two Sherpas. Under fearful difficulties they succeeded in bringing the sick leader of the expedition back to Camp IV, from where he was carried down to Camp I with the help of all available Andeans and Sherpas. During this task the Sherpa Pemba Norbu had his feet frostbitten. Watzl, Bertonecelj, Magnani and Ang Nyima also had frostbite of a lesser degree.

The return journey in the humid heat of the monsoon was a dreadfully unhappy one. Ibañez and Pemba Norbu had to be carried all the way. On June 30th Ibañez died in Katmandu hospital, despite every attention. Such was the tragic conclusion of this great and courageous enterprise.

THE API PROBLEM

In the north-western corner of Nepal stands the Api-Nampa Group, of 23,400 ft. and 22,160 ft. respectively. Api (in Tibetan written *ap'i*) means "grand-mother", and Nampa (*gnam-p'a* in Tibetan) means something like "heavenly father". The higher of the two, the chief summit of this region, has a benign look from the north and to this obviously it owes its name.

Api was discovered and fancifully described by the notorious Henry Savage Landor in 1899. Actually this Tartarin of the Himalayas only got as far as 16,400 ft., as Dr. T.G. Longstaff was able to show in 1905. After that things were quiet around the mountain until the important exploratory journey by Heim and Gansser in 1936. Their fine book *Thron der Götter* also includes a 1:650,000 survey map, a sketch map of the Nampa Valley and numerous photos, among them a panorama and five pictures of Api. Unfortunately, Gansser confused the positions of Api and Nampa: Api, in particular, was erroneously named Nampa, and Nampa was named Chisel Peak; this was only cleared up in 1953.

From May 23rd till the end of July in that year W.H. Murray and J. Tyson circled the Api-Nampa Group in a clockwise direction.¹ Owing to the monsoon they made no major ascent; only a small sixthousander (c. 20,000 ft.) in the Yokapahar Himal was reached. But this exploratory journey of almost ten weeks

¹ John Tyson: "Exploring the Api and Nampa Group", *A.J.*, 19, pp. 411-7.

yielded some important information concerning this hitherto very little known region. The difficulties involved in this round trip were incidentally raised, since on the Indian side the "Inner Line" may not be crossed by Europeans and Americans, which means that the great pilgrim route on the right (west) shore of the Kali River is closed to Sahibs, while on the Tibetan side all contact with the Red Chinese frontier troops in Taklakot must be carefully avoided, so that the other side of the Zaskar Range can only be done by night. So the Iron Curtain is a nuisance also to Himalayan exploration!

In the Spring of 1954 a new candidate slipped in, the wellknown Piero Ghiglione, who, aged 71, returned to the Himalayas after three expeditions to the Andes.¹ The Nepalese government's permit for the Api region came first, as Ghiglione was already in Delhi.

As companions he had chosen three capable young climbers of the C.A.I.: Dr. Giorgio Rosenkrantz, aged 32, a veterinary surgeon from Turin and the expedition's doctor; Giuseppe Barengi, an engineer from Milan, 34; Dr. Roberto Bignami, aged 26, a pharmacist, also from Milan, who was to make a colour-film. This light expedition was to take only 2½ months; indeed, everyone paid his share, which was reckoned at £460. Captain Y.R. Puri went along as Liaison Officer and Interpreter. The three Sherpas were: Gyaltsen Norbu (No. 145) as Sirdar, Tashi Kiron (No. 180) and the young Cheden Phanjo (aged 24, new). All three have well proved their worth.

They left Delhi on April 25th, 1954, and travelled through Tanakpur to Pithoragarh in Garhwal. From here they started on April 25th with 35 porters and marched 15 miles eastwards to Jhulaghat (2130 ft.), where the Kali River and the Nepalese frontier were crossed. Ghiglione wanted in fact to ascend the Chamliia Valley, which leads direct to the southern foot of Api. This approach was a mistake. As one could well see from the Heim-Gansser pictures, Api's walls on the south side are colossal. But this valley had the charm of novelty and was so far completely untrodden. It proved to be narrow and sinuous, sometimes barren and sometimes luxuriantly overgrown, and went perpetually up and down along a wretched track. No fewer than twelve days were taken up by this arduous route. When the expedition emerged on May 9th from this sub-tropical virgin forest, it stood before the formidable southern wall of Api and the next day set up its Base Camp on a flat patch at about 13,000 ft. Ghiglione, who already had experience of the Himalayas, saw at first glance that this face of Api was impossible, but his companions were still enslaved by Alpine ideas and were not quickly persuaded. So ten days were lost in the fruitless reconnaissance of a wall that was

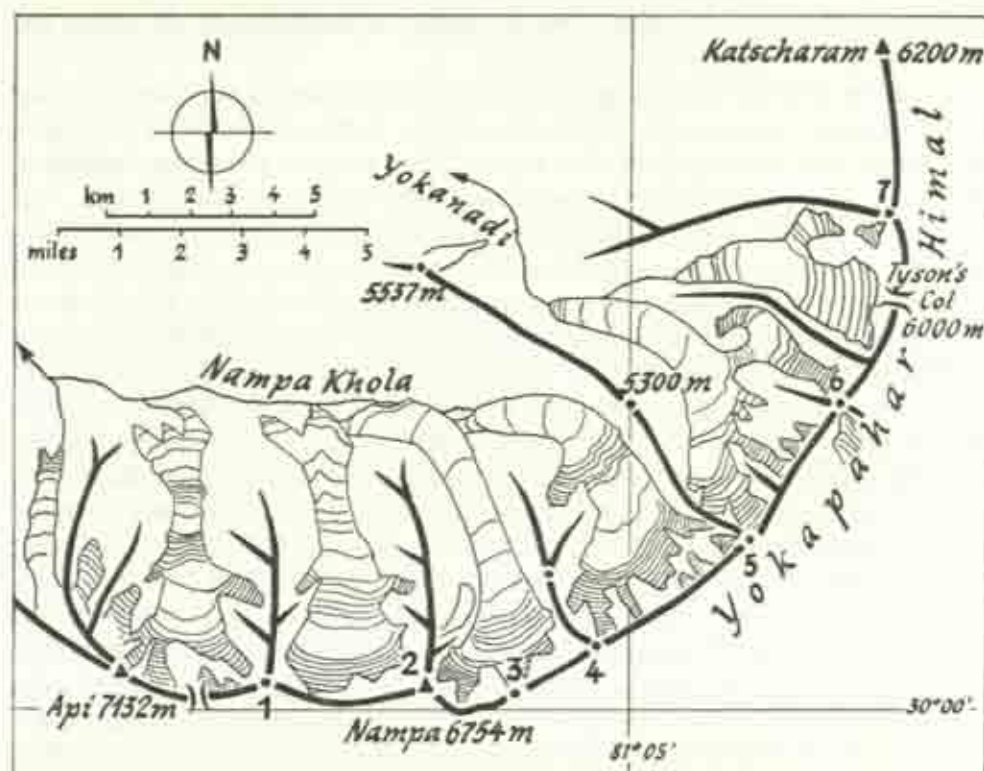
¹ These are the sources for the story of Ghiglione's tragic Api expedition. *La Scarpina* (Milan), 1954, Nos. 7-15, 19, 21, 23; *Epistole Montane*, 1954, pp. 103, 182-3, 271-7, 307; *Boll. C.A.I. Milano*, 1954, pp. 74, 211-16; P. Ghiglione: *Errore e Tragico sul Monte Api* (Gazzera, Milan 1954. 170 pages 36 illustrations. Map 1:185,000.)

over 7 miles long and 10,000 ft. high. Two attempts were pushed to saddles of 18,370 ft. and 19,190 ft. It was seen from both of these that the north side of Api must be much less steep.

So they decided to go there, but it was a long journey. The return trip through the Chamlia Valley began on May 24th. On the next day the first blow fell: while crossing a footbridge Bignami slipped, fell into the river and was swept away, without his friends being able to help him in any way. They sought him in vain for two days. Then they went by the shortest route to the Kali Valley and by way of Rapla (7500 ft.) reached Tyson's itinerary. In Dumbling the caravan split up: Rosenkrantz, Puri and Tashi crossed the river-frontier, to send news to Europe from Garbyang, while the bulk of the expedition toiled terribly hard through the great gorge on the Nepalese side of the Kali. Tyson and Ghiglione are agreed that this is a real "way of the cross".

On June 8th, at about 13,000 ft., the Base Camp was established in the Api Valley. With Barengi and Gyaltsen, Ghiglione made a first reconnaissance of the West Api Glacier, which is tolerably flat and fills the whole valley floor. Like Tyson, he too regarded the ice-fall of the lateral glacier as impassable; but he soon discovered a more natural route further north, where the slopes are much less steep. On his return to Base Camp he found Rosenkrantz, who had arrived from Garbyang. He was in a great hurry; he wanted to be back in Turin by the end of the month and therefore wished to dispose of Api in the quickest way. Ghiglione in vain tried to convince him that one should not hurry a Himalayan attack so much. After a further reconnaissance, Camp I was set up on the western main glacier. On June 12th and 13th this camp was pushed up to 17,700 ft. (II) and on the next day a wide, steep snow-couloir was climbed to the upper glacier, where a labyrinth of crevasses was crossed and the route to Camp III (20,180 ft.) was marked out. It was on the snow-cap of the large dark rock-buttress of the ice-fall.

Ghiglione planned a fourth camp at about 21,600 ft., to break the long ascent to the summit, but his young friend, who was still in a hurry, wanted to set off at midnight to conquer the peak in one go and get down again to Camp II the same evening. Unluckily, on June 15th the weather was doubtful, and the start was delayed until six. Barengi and Rosenkrantz went first; Ghiglione followed a little later with Gyaltsen. The latter climbed very quickly, soon caught up the other two and roped up with them. Towards midday the weather deteriorated and Ghiglione halted at a height of about 21,600 ft., beside a rock island near to the watershed between the Api and Nampa valleys. He saw that the other three were still climbing and preferred to go down to Camp III before the Sherpas took down the tents. On this descent he repeatedly lost the track in the mist. Tashi and Cheden turned back wretched and exhausted, without having seen



anyone. With evening the storm began to rise and Ghiglione spent a bad night, very anxious about his friends.

The searches on June 16th and 17th were not successful and provisions were scanty. So Ghiglione went down on the 17th to the lower camp. According to his account, Gyaltsen appeared there the next day, June 18th, in the dawn, completely exhausted, snow-blind and scarcely recognisable.

What had happened meanwhile?

After Ghiglione had turned back, the other three forged ahead, but some 300 ft. below the east summit (probably not the true east summit is meant, but a wide plateau-like shoulder) Rosenkrantz suffered severe mountain sickness and vertigo with nose-bleeding. He stayed behind, while Barengi and Gyaltsen climbed on. Gyaltsen observed that Rosenkrantz was obviously in a very bad state. Thereupon Barengi ordered him to go down to Rosenkrantz with the rope and give him help. It was very misty, but Barengi hoped that higher up (so they were not yet on the true summit!) the view would be better and that he

would be able to take a couple of photos there. So he set off on the ascent and from this solitary trip he never returned.

Gyaltsen went down to Rosenkrantz and they bivouacked together (from the 15th to 16th). A very bad night—the Sherpa massaged his sick Sahib again and again, and tried to keep him warm. They had no provisions whatever, for these were in Barengi's rucksack and they waited for him in vain. The weather on the 16th was also very misty. Gyaltsen tried to get Rosenkrantz down, with the help of the rope on the steep slopes, half-dragging and half-supporting him on easier terrain. But they got only about 1000 ft. lower, to the proximity of the rock island where Ghiglione turned back. There followed a dreadful second bivouac (from the 16th to 17th) without anything to eat or drink. At three in the morning of the 17th Rosenkrantz died, although Gyaltsen cared for him as much as he could. Now Gyaltsen descended alone and at nine in the morning came close to Camp III (20,170 ft.), which had already been abandoned. But he was snow-blind; for in his concern over Rosenkrantz he had left his snow-goggles behind, and it was a clear and sunny day. All day the Sherpa had to remain seated, shielding his eyes from the light with his hand. At last in the afternoon he was able to start his descent, feeling with his ice-axe where he was going, seated or on all fours. So, passing the abandoned Camp III, he reached Camp II at nine in the evening. It too was empty! Later he came to water, quite near Camp I, drank some and slept awhile. Then he dragged himself on. On the morning of the 18th he saw the porters from Camp I and called out; Captain Puri came out from his tent. A moving account and once again a wonderful performance by a faithful and gallant Sherpa!

In conclusion, this must be said: how Barengi ended no man knows. Was he torn off the ridge by a gust of wind? That he climbed the true summit of Api is possible, but not certain. Whether he also reached the west summit of Api is quite unknown. The end of the struggle for Api remains a tragic secret that will perhaps never be cleared up.

UPRISING OF THE FAITHFUL

By Junjiro Muraki

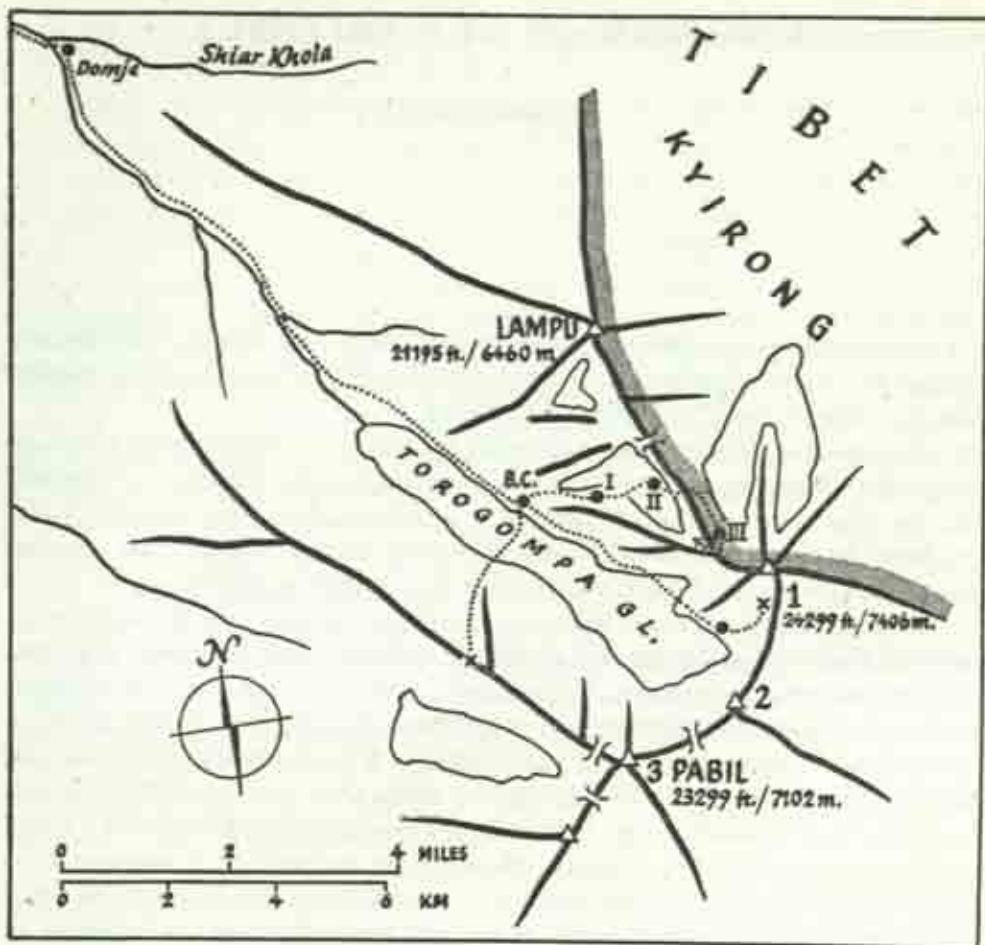
In the spring of 1953 we had reached 25,425 ft. in our attempt to climb Manaslu (26,658 ft.) in the Himalaya. As a result of this achievement we were confident that the summit would eventually be reached.

The Japanese Himalayan Committee and the Mainichi Newspapers, who supported the enterprise, came to share this view and, making the ascent of Manaslu the sole objective, organized a formidable expedition of 13 men, who left Japan for Nepal by air early in March (1954). The party comprised eight men who had had experience in the Himalayas, and five young college graduates.

On completing the troublesome transport of supplies from India to Nepal, we set out from the Nepalese capital of Kathmandu on March 19th, far behind schedule. Our huge caravan, including 22 Sherpas and 450 porters bearing 14 tons of equipment and supplies, left Kathmandu in two parties a day apart. On the seventh day, a rest day, we planned a meeting of the two groups. We calculated on 18 days to take us to the Base Camp of Manaslu. In the two weeks since leaving Kathmandu and ascending Buri Gandaki gorge to Ngyak, the march proceeded without a hitch.

However, on April 1st, when the advance party reached Ngyak, we were confronted with difficulties for the first time. At Sama the inhabitants drove the Japanese expedition out and threatened to fine native collaborators 300 rupees or to whip them, causing some of our porters to ask for dismissal. They claimed that the heathen Japanese desecrated their "holy mountain" of Manaslu arousing the wrath of the gods, who sent calamity and pestilence to their village the previous winter in the form of a great avalanche that crashed down on the valley east of Manaslu, destroying a 300-year-old gompa (lamasery) and killing three lama priests, causing drought and smallpox and epidemics. This was hearsay. To confirm this, we pushed on. It all became clear on the morning of April 6th, when the advance party was 2 miles from Sama Village. Its progress was halted. Masami Murayama, a member of the expedition, Sirdar Gyaltsen and interpreter Dilli Verma Bahadur, who went to the village to negotiate, were surrounded by hundreds of villagers in the village square.

All attempts at negotiations with the village representatives, however, were in vain. They steadfastly refused the Japanese entry into Sama Village or to ascend Manaslu. If the Japanese should attempt to force their way, they would



fight to the last man to prevent it, they declared. After the porters left, the village leaders, gesturing menacingly, threatened to behead the Sherpas, and villagers, including women and children, armed themselves with yak dung and stones to hurl at us. We could not understand the attitude of the natives, who even refused to recognise the pass issued by the Nepalese government. Realizing the risks and dangers involved in a forced passage, we withdrew to the safer Ngyak area and on April 8th dismissed all the porters. We reported on the situation to Tokyo, the Nepalese government and others concerned, and studied what steps could be taken.

We were not abandoning Manaslu. It was decided to open negotiations with the Suppa of Chonkan (Dzong Ka?), the headman holding authority over the Tibetan villages in the area. Murayama, interpreter Dilli and Sherpa Ila Namgyal were dispatched to Chonkan on a round trip of five days.

The Suppa permitted them to have another talk with Sama representatives. He received them cordially and was considerate of the stand they took, but entry into Sama by the expedition was declared impossible. However, he acceded to our wish to climb nearby Ganesh Himal. The vast stores of equipment and food supplies geared for the Manaslu climb, far beyond requirements for climbing a 23,000 ft. peak, were repacked. Leaving the surplus baggage at Jagat, the party ascended the Shiar Khola towards Ganesh Himal.

On April 21st, a month after leaving Kathmandu and wandering about, the expedition set up its Base Camp on a rhododendron studded clearing beside the moraine of Torogompa Glacier.

We had little information on Ganesh Himal, except what was heard from Ila Namgyal, who was Sirdar of the New Zealand expedition in 1953. The Ganesh Himal, as seen from Torogompa Glacier, is dominated by Peaks 1 to 3 and did not appear so imposing, but it was bewildering to find a route up among the overhanging rocky cliffs and awesome jagged crests of rock.

According to Ila Namgyal, the New Zealand expedition scaled the saddle between Peak 1 (24,299 ft.) and Lampu (21,195 ft.) and 650 ft. above it to flat terrain where it pitched Camp IV and turned back. By traversing from the saddle along the slope on the Tibetan side and striking directly north along the skyline, the summit could be reached, he said.

With the time element pressing, we rushed operations. On April 26th, a reconnaissance party of three climbers and three Sherpas was sent to the border line area. The camp sites are shown in the accompanying sketch maps: Base Camp at 13,616 ft., Camp I at 16,240 ft., and Camp II at 18,374 ft.

A reconnaissance trip from Camp II on the skyline between Lampu and the main peak showed that Ila Namgyal's version was far off the mark. The lowest saddle on the frontier skyline was a knife ridge, the crest of which was barely wide enough for a man to stand and on the Tibetan side plunged down a sheer ice precipice of 6500 ft. Pushing north from the main peak on the skyline would undoubtedly take one to the top. But to get there was another matter: not a simple undertaking since we should be required to descend the 6500 ft. ice precipice and skirt the foot of the mountain. But we could not hope to trespass safely through Tibetan territory via Kyirong (9088 ft.) at the base of the mountain.

The skyline directly above the saddle in the direction of the summit stretched over ice precipices overlying rocky cliffs. It was no wonder that the New Zealanders were pushed back. Disappointed and frustrated, and unconscious of the violent cold north-westerly wind lashing us, we stared, completely at a loss, at the inviting, light green pastures of Tibet far away. Our reconnaissance suddenly came to an end. We returned to the Base Camp and, disregarding the steps taken by the New Zealand expedition, decided to find an entirely different route.

For another week, starting from the Torogompa Glacier area, we scouted about the Ganesh Himal mountains. The several reconnaissance parties sent out every morning returned in the evening to the Base Camp, exhausted but without finding an ascent route from the Torogompa Glacier side.

In early May we re-considered climbing the route taken by the New Zealand expedition. Although most of us felt we would not get far, we decided on another attempt. For ten days, until May 13th, we pushed on, setting up Camp III at 20,178 ft., from where the New Zealand party turned back. As shown in the photograph, we attained the 21,000 ft. level and turned back. Nowhere beyond this point—on the icy slopes, knife ridges and the rocky cliff 650 ft. below the summit—were we able to locate a safe camping site.

On May 18th the expedition divided into three parties, evacuated from the Base Camp and headed for Kathmandu.

A. Three expedition members, headed by leader Hotta, and most of the Sherpas, carrying most of the equipment, went straight back to Kathmandu via the Buri Gandaki.

B. Eight climbers and six Sherpas, lightly equipped, took the route via Rupina La (15,532 ft.), scouting for a possible ascent route on Himalchuli (25,802 ft.).

C. The two newspapermen of the expedition and two Sherpas, lightly equipped, struck eastward from the Buri Gandaki and circled the Gosain Kund region on the return trip to Kathmandu.

Because of the approach of the monsoon, neither team A nor team B were able to accomplish much. Team B ascended the Chuling Khola along a path untrodden by civilized man to the foot of Himalchuli and crossed the Rupina La. The main Chuling Glacier, approximately a mile wide and flowing down immediately below Himalchuli cascades, forms an awesome ice-wall of innumerable levels and reveals no possible route of ascent.

Due to the almost incessant rain during our five-day stay there, we were able to catch a glimpse of Himalchuli's crest for only an hour and our reconnaissance activities were limited. That we learned unmistakably about the treacherous contour of Himalchuli's eastern face, was all we had to show for our efforts.

Crossing Rupina La on June 1st in a snowstorm, we returned to Kathmandu via Barpak on June 12th.

Personnel of the 1954 Japanese Himalayan Expedition: Yaichi Hotta (leader), Genkichi Taniguchi, Masami Murayama (manager), Kiichiro Kato, Jiro Yamada, Funjiro Muraki, Hideo Yamazaki, Yuichi Matsuda, Yukio Matsuzawa, Minoru Higeta, Hirokichi Tatsunuma (doctor); Sakuta Takebushi and Takayoshi Yoda (Mainichi newspapermen).

ALONE OVER EVEREST

By Kenneth Neame

It was towards the end of 1946 that the thought of flying to Mount Everest first entered my head. As a pilot in the R.A.F. I had been posted to a photo reconnaissance squadron "somewhere in India". Having arrived as a passenger in a transport plane there was now a short wait at the airfield at Mauripur, just outside Karachi, before being told where to go. I had read a book about Everest a few years before, so I knew a little about it, about the long route through Tibet, about the Rongbuk Valley, and had seen photographs which showed Everest rearing majestic and alone at the end of that valley.

Now I expected that to be posted to a reconnaissance squadron meant for me to be posted to a squadron with longrange Spitfires, for they were the only operational aircraft I had so far flown, and they had a flying range of several hundred miles. So the thought entered my head that if I were lucky enough to get sent to a squadron in the north of India, there might be a chance, on a practice flight, of having a sight of Everest. However, it was only a boy's dream, for I was not quite 21 and had not taken into account the factors that would be involved. For one thing, India was a far vaster place than I had imagined. Secondly, Everest lies 100 miles north of the Indian border. And thirdly, the nearest active airfield was at Calcutta, about 400 miles away. So my dream became more of a dream as time wore on and I learnt more about India. In fact, by the time I was on the squadron and flying a week or two later, I had completely forgotten about Everest. Not so the Himalayas, for I love mountains, not as a rope-climber, but merely as a scrambler, and I knew that another dream of mine, namely, to see the Himalayas, would inevitably come true when I started to fly. For my posting was to No. 34 Squadron, a squadron of photo-reconnaissance Spitfire XIX aircraft at Palam, seven miles outside Delhi.

Now Delhi is 200 miles from the Himalayas, and when I started flying on the squadron, my second dream came true. I shall never forget the first time I climbed up in a Harvard trainer aircraft with another pilot who was flying the "kite". At about 6,000 ft. we rose through the blanket of heat haze that is ever present in India, and as we came into the blue above I strained my eyes northwards, catching sight of snowy peaks slowly appearing. As we rose still further, they rose with us till

I could see the whole of these giants from the dark foothills to their white jagged tops, a long line of them stretching from horizon to horizon. I did get a chance to go nearer to them once and get some photographs. But that story cannot be told here. Suffice it to say that I flew 100 miles over the foothills towards them, feasting my eyes on peaks I had heard of and others that at the time I had not—Trisul, Nanda Devi, Gauri Parbat, Hathi Parbat, Kamet, Nilgiri Parbat, and the Badrinath Range, all of them visible in one sweep of the eye, a sight I shall never forget.

But to get back to Everest. It was in 1947, towards the end of March that a request came through for one of our aircraft to take some photos of the mountains of Sikkim, south-east of Kangchenjunga. Apparently an American, Dr. Church, was taking an expedition into the Himalayas in this region to find out some facts about the snow-fall in the area so that new plans for irrigation might be got under way. They originally wanted vertical photographs, but we told them that for various reasons they couldn't have them, and that they would have to be content with oblique photographs, that is, photographs taken from a camera looking out of the side of the aircraft. (The aircraft cameras worked automatically. The exposure, etc., was set before leaving the ground, and all the pilot had to do was to align his aircraft correctly, turn a knob in front of him, and the cameras took the photographs and turned over the film by themselves.) Oblique photographs, it was then stated, would be all right, but they were wanted, and wanted urgently. Very urgently, in fact in a matter of a few days, which meant that we would have to work fast, taking an aircraft down to Dum Dum airport in Calcutta, getting the photographs, bringing them back, getting them developed and printed in Delhi, and finally sending them to Dr. Church in Calcutta.

Just to give some idea of the urgency, this was March 25th, and Dr. Church wanted the photos by April 1st.

Panic ensued in the squadron—a decision had to be made as to who was to tackle the job. The requirements for the pilot were that he should have taken oblique aerial photos before, and that he should not be otherwise engaged. As luck would have it, I was the only one of us who fitted both these criteria, and so I was the one who had to go.

Naturally, I was overjoyed. Thoughts of Everest came flooding back, though I only expected to see it from a distance, but even the thought of just seeing it delighted me. And not only would there be Everest, but also Kangchenjunga, which I would see at close quarters.

So, early next morning, March 26th, I got my things together, worked out how to get to Dum Dum, and set off with a 90-gallon drop-tank slung under the aircraft's belly. This would give me 300 miles or so extra range, which I would need when taking the photographs round Kangchenjunga. On arriving at Dum

Dum, I was struck by the difference between the weather there and that at Delhi. In the air, it was much the same at both places, the usual heat haze and not a cloud in the sky. But whereas on the ground at Delhi it had been hot but comfortable, here, as soon as I stopped the breezy engine, the clamminess of the place closed in on me.

Having arranged where I was to sleep and eat, I went to see the "met wallahs" (meteorologists) about the morrow; here at Dum Dum they were Indians, who knew their job backwards. I wanted to know, naturally enough, what the weather was like up near the Himalayas.

"Not too good", they said. "At the moment there is cloud covering the foothills. The best time to find no cloud is first thing in the morning, but it soon starts building up as the day warms up. Also, there's a depression to the west of the Darjeeling area, which is where you are going, and at the moment it's somewhere in the region of the central Himalayas. Unfortunately for you, it's moving east, though it shouldn't hit Darjeeling for a few days yet, but each day there will probably be a bit more cloud than the day before."

I thanked them and went out. The fact of a depression in a day or two, which meant bad weather, didn't worry me unduly, as I had to be in and out with my photos pretty quickly anyway. But the building up of the cloud worried me, for I couldn't be there too early, as there would then be insufficient light for taking photographs. I was between the devil and the deep blue sea. Anyway, I had better set off early tomorrow, yet sufficiently late for there to be enough light by the time I got there.

After rising next morning, I paid another visit to the "met wallahs". "Yes", they said. "We're afraid it's still the same story as we told you yesterday, but can't guarantee how soon the cloud will start building up."

So off to the "kite", which I had asked should be ready early, to check up that everything was all right, and then to start moving. I climbed in, checked the cockpit, and started the engine. Everything was working beautifully, so I turned on my oxygen, as I was going to climb straight up to heights requiring oxygen, and taxied out. At the end of the runway, after a further check of the cockpit, I opened the throttle and roared down the runway.

Kangchenjunga was 360 miles away, and I expected it would take 1¼ hours to get there. As I took off at 8.00 a.m., I should arrive there at about 9.15. Between those two times there was nothing to do except watch the compass and air-speed indicator and keep my climb steady. Occasionally I looked over the side to try and do a bit of map-reading, but the haze was bad and I couldn't see very much. Gradually I could see the top of the haze getting nearer and nearer, and the blue of the sky becoming more and more intense. Slowly I emerged from the haze at 12,000 ft. There wasn't a cloud in the sky, except perhaps for a few

cirrus clouds, very far away and very high. The top of the haze dropped below me like a great flat grey-brown woolly rug, with no sign of the earth except directly below me. I strained my eyes ahead, for I knew that there lay the Himalayas.

And then suddenly I saw it, the great peak I had been waiting for, Kangchenjunga. What a lovely name, a mixture of fairyland, and mystery and power. To me, as I first saw it, it looked small, very small, like a bit of icing on the top of a cake, a tiny white peak rising above the horizon of the haze, with the deep blue of the sky above. At first, that was all. Then, as I climbed still higher, I saw more of it, so that the white peak appeared to ride on a great buttress of more snow, with lesser peaks supporting it on either side. Then more and more, till there was a great broad base, a mixture of whites and blues, culminating in the summit of Kangchenjunga.

Then, suddenly, before I had really got used to the mass of Kangchenjunga, I looked away to the left of it, and much farther off I saw Everest for the first time. A rather insignificant Everest compared with the nearer Kangchenjunga, but Everest nevertheless. Yet it wasn't by itself. It was one of a group of three which, from this angle, were close together—Everest, Lhotse, and Makalu. It was difficult from this distance and angle to tell which of the three was Everest, but one of them appeared to be very slightly higher than the other two.

After feasting my eyes on Kangchenjunga and Everest, I looked at the rest of the Himalayas in that region, which had now appeared, and stretched from horizon to horizon. Away to the right of Kangchenjunga, but much lower, was Chomolhari, although I couldn't identify it at the time on my small-scale map of 16 miles to the inch.

Now I could put away my map and fly with the nose of the aircraft pointing to Kangchenjunga.

At 20,000 ft., which was my height for taking the photographs, I levelled out. I was now half-way and still had about 180 miles to go. So I settled down to enjoy the magnificent spectacle before me. Still no sign of cloud.

However, as I got nearer to the foothills, which stretch for about 60 miles south from the snow-peaks in this region, I began to see patches of cloud covering them. The question was, how high up the mountains did the cloud reach? As I got still nearer, I could see that it almost completely covered the foothills, with puffs of cloud rising up the side of the mountains to 13,000 ft. This was just above the snow-line, so that the latter was covered by cloud. As Dr. Church's specific requirements were that the snow-line on the mountains should be visible (they wanted to know the lowest extent of the snow at that time of year), it was better that I should postpone the photography till the next day, in the vain hope that conditions would be better.

This being decided, the question was, what next? The Powers That Be would no doubt have said firmly, "Return to Base". But who, with a powerful aircraft, plenty of petrol, and Everest only 100 miles away, would have turned back? It was the chance of a lifetime, and once I had decided that the R.A.F. photos could not be taken, there was no doubt in my mind as to what to do next. My dream had already come true in just seeing Everest, but now an impossibility was going to be accomplished,

Forward went the throttle, and I started climbing still higher, so as to be able to clear the lesser peaks and get above Kangchenjunga. I was now about over Darjeeling, though I couldn't see it for the cloud, and the next thing was to get out my Leica. But how was I to take photographs? If I opened the hood, there might be a risk of frostbite, but, what was worse, the buffeting from the slipstream would knock the camera about so much as to make photography impossible. So I would have to take the photographs through the perspex, scratched though it was, and try and find a comparatively clear spot, holding the camera in my right hand and steering the aircraft with my left. I couldn't leave the aircraft to steer itself, as the uneven balance of fuel in the wing tanks meant holding on to the "stick", or control column, all the time.

As I have already said, my map was a small-scale flying one, 16 miles to the inch, and so I couldn't identify any of the peaks around me. Kangchenjunga and Everest were the only names I knew. So, apart from these two giants, I photographed peaks that looked interesting or beautiful, as well as taking general views.

As I climbed towards Kangchenjunga, I crossed over the belt of cloud that covered the foothills, with the snow-capped range of the Himalayas stretching out ahead of me to right and left. How far could I see as I climbed towards 30,000 ft.? It is difficult to say. Theoretically, the farthest distance visible from this height is 212 miles if the horizon be at sea level, or 150 miles if at 14,000 ft., the height of the Tibetan plateau. So I should have been able to see the ground 50 miles short of Lhasa, which was 200 miles away. As for the mountains, which, although they stand high, are hidden to some extent by their nearer, and often higher, neighbours, I cannot say accurately, but my photos definitely show Gyachung Kang, 150 miles to the west, and Kula Kangri, 24,786 ft., on the Bhutan-Tibetan border, 170 miles to the east. However, as the eye can usually see more than the camera, I suppose the farthest visible mountains were roughly 250 miles at a guess; in other words, just about as far as Manaslu, which is 50 miles short of Annapurna, to the west. Needless to say, I couldn't have identified them at that distance, even had I had a large scale map.

Any names other than Everest and Kangchenjunga that I mention will be those that I have identified from my photos.

Nearing Kangchenjunga on its eastern side, I had to cross over a jumble of snowy peaks rising up like spires from the depths below, Siniolchu, Simvu,

Pandim, and others and, winding between them right up to the base of Kangchenjunga, I could see the colossal Zemu Glacier. Never having seen a glacier in my life before, this one thrilled me, though I had always thought of them as white rivers of ice. Grinding away the sides of the mountains, the Zemu had largely covered itself with a sandy-coloured layer of moraine which gave it a rather soft and gentle look compared with the hard white of the ice at its head.

The thought came into my head: "What happens if the engine cuts?" Still, it didn't really worry me if I didn't try to think too hard about it, as the snow-slopes and plateaus below looked so deceptively soft and gentle that I almost felt that it would be possible to make a forced landing on them. However, my ears were open just a little bit wider to detect any evidence of roughness in the note of the engine.

Still higher, and Tibet began to spread out before me. It was a thrilling experience, that first sight of Tibet, a land so utterly unlike the green and light sandy colour of India. A dead land from another planet, or so it seemed to me, dried up by the burning sun and lack of rain, a reddish-brown desert world with rolling hills and occasional snow-peaks, where nothing was ever meant to live. But I knew that down there, though I couldn't see them, were villages and men and women who lived ordinary lives even though they were more or less cut off from the rest of the world.

Now I was at 29,000 ft., just north of Kangchenjunga and slightly above it, swinging round to the west to head for Everest, 80 miles away. True, I was over foreign territory, Tibet, but somehow I didn't seem to think of it as being "out of bounds", though of course I realised it was. At that height the world is one, and country boundaries do not exist except on the map one is carrying. They seem a figment of the imagination, and it is easy to forget the petty national squabbles that go on below.

How slowly the aircraft seemed to climb at that height. I think it must have been the extra drag of the drop-tank that I was carrying, which, though empty now, was a bulky thing to push through the air. I was now flying parallel to the Nepal Himalayas above their northern edge, with, on my left, a meaningless jumble of snow-peaks, beyond which were the clouds piling up over the foothills, and still farther away, the dirty-coloured heat haze of India; on my right, directly below, were the few peaks of the Tibetan Himalayas, and beyond them the rolling 14,000 ft. plain of Tibet.

I was aiming at a height of 32,000 ft., so as to be well above Everest, but, even at that height, from about 40 miles away, Everest (29,002 ft.) still seemed to be above me. It was only an illusion, though, as, when I got there, I found that my altimeter was reading accurately, as nearly as I could judge. (Could this sort of illusion explain the American pilot who, during World War Two, while

flying over the Burma "hump", thought he had discovered a mountain higher than Everest?) But at 32,000 ft. I started to have trouble. I began to get dizzy, which I knew indicated oxygen lack. My oxygen supply was all right, so it must be that my mask wasn't fitting too well. By pressing the mask tightly against my face with one hand the dizziness stopped, and I descended to about 30,000 ft., where it didn't recur when not holding the mask.

As I got nearer to Everest, with Makalu and Chamlang on my left, I began to wonder which peak *was* Everest. For the Everest massif consists of two peaks with only 1000 ft. difference between them, Everest (29,002 ft.), and Lhotse (27,890 ft.), and to me, looking down on them, they appeared to be much the same height. Unfortunately, all the photos of Everest that I had seen, which were taken up the Rongbuk Valley, showed only one peak, and so I was, to say the least, baffled by this unexpected duplication of the mountain. It may be wondered why I didn't identify which was Everest by the fact that the Rongbuk Glacier flowed north from it, but that was my undoing, for, approaching Everest from the direction of Kangchenjunga, I came up to the Kangshung Glacier at an angle, and this made me think it was the Rongbuk Glacier. Why did I make such a futile mistake, particularly when the Rongbuk flows north, and the Kangshung flows east? I can only suppose that, as already mentioned, oxygen lack was the trouble, although there were no symptoms of it (a common finding in oxygen lack), and that a large glacier combined with a double mountain at the head of it so obsessed me that I had no thought to check my heading or to see whether the glacier flowed towards the great open plateau of Tibet or not. As a result of this confusion, my thoughts went something like this: "If the right-hand peak (Everest), which does appear slightly the higher of the two, is Everest, and the left-hand ridge (the south-east ridge) is the climbing ridge, then the climbers would have to cross the left-hand peak (Lhotse) to reach it from the Rongbuk Glacier (actually the Kangshung Glacier). But if the left-hand peak (Lhotse) is Everest, though it doesn't look so high as the other one, what the devil is the right-hand peak (Everest) doing there at all?" At which point I gave up.

My idea was to get close-ups of the climbing face as well as all-round shots of Everest, with the vague idea that they might be useful to someone later on. (I was, of course, thinking all the time in terms of the Tibetan route and the north-east ridge, as the southern route and the Western Cwm had not been thought of then.) So I took photographs of both peaks, mostly, as luck would have it, of Everest, and some of the sweep of the ice-covered sheer east face, thinking that it was the face abutting on to the Rongbuk Glacier; also one of the top of Nuptse, which was covered entirely with ice on its north side.

As I neared the two peaks and closed in over the Kangshung Glacier something hit the aircraft with a terrific kick. I am not quite sure exactly where it was, but

it might have been an up-draught coming over the North or South Col. It shook me a bit, particularly as my controls were rather sloppy at that height, definitely ruling out any question of getting really close. Even so, after that, I kept the aircraft at a distance of what I thought was about half a mile. Since then, however, my photographs have produced evidence to show that at no time was I closer to Everest than $1\frac{3}{4}$ miles, while most of the time I was about 2 miles distant.

To fly directly over Everest was out of the question with the oxygen trouble, as a clearance of at least 4000 ft. would be needed for safety, and that would mean a height of 33,000 ft. (Under normal circumstances that sort of height in a Spitfire XIX would be easy.)

Everest itself surprised me. For some reason I had always imagined it to be grey and white, probably because the photographs I had seen were in those colours. But here it was, not a gaunt grey, but a pleasantly mild sandy-brown colour, blending well with the darker browns of Tibet. Its glaciers, too, except where the cold white ice was exposed near the mountain's flanks, were covered with moraine of the same sandy-brown colour. (Colour photographs unfortunately do not do these lovely blends of colours justice. In fact, had I not seen Dr. T. H. Somervell's beautiful paintings of the mountain, I might have wondered if my memory was at fault.)

That day there was no plume of driven powder-snow on the mountain, a feature which is present more often than not. There was only a slight puff of vapour on the leeward side of the peak about half a mile from the summit, which, at the time, I did not notice, though it appears on the photographs. I suppose it was caused by the terrific suction on the downwind side, as the powerful winds swirled past and caused a sudden drop in pressure as they tried to fill in the gap caused by the 11,000-ft. peak of Chomolhari, to the east of Kangchenjunga. Why, I don't know.

After flying round those two giants a couple of times, taking photographs the while, I decided it was time to head back to Dum Dum. Even when I turned southwards on to course, my disorientation didn't dawn on me. A last glance at Everest and Lhotse, a few more photos of the lesser peaks to the south on either side of the aircraft to finish the film, and I settled down to watch the compass and make my way the 400 miles to Dum Dum. It would take less time than the flight to Kangchenjunga as it was all "downhill". Although I had a fair amount of petrol left, I wasn't going to take any chances and play around the peaks any longer. Better to land with plenty of petrol than to get lost and run out of fuel on the way.

The return trip was uneventful, with level flight at first, noticing landmarks to see if I was on course, and then down through the haze again and back to sticky Dum Dum.

I landed at 11.05 a.m., 3 hours 3 minutes after take-off, with the aircraft in perfect order.

And what happened about Dr. Church's photographs? I went up to Kangchenjunga again next morning at the same time, but unfortunately the cloud conditions were exactly the same as the day before. There would obviously be no improvement if I waited any longer, so I got on with the job and took the required photographs in spite of the clouds. I looked over to Everest which, away to the west, looked exactly the same as on the previous day, but there was not much time to admire the mountains. I had to get back to Dum Dum.

Many months later, I set about identifying the various peaks on the photographs, and, in particular, Everest. What was remarkable was that the peak in the spring of 1947 was identical as regards the patches of snow on it with its appearance in 1924 and 1933. Each tiny patch of snow was exactly the same in shape, size, and position, and it has been possible to mark the position of Camp VI, 1933, on them with extreme accuracy, by the aid of a particularly odd-shaped snow-patch.

Finally, I would like to point out that a trip of this sort to Everest does not involve flying which is anything out of the ordinary. There is nothing abnormal about the height one has to fly or the distance one has to travel. The only unusual fact is the ownership of the territory over which one flies. As for the mountainous nature of the country, some of our photo reconnaissance trips took us over far worse country, some of which was desert, while some was dry and waterless rugged hill country. The big difference in this case, I suppose, was that nobody would have known where to look should anything have gone wrong.

Note: Some of the author's photographs, taken during this flight to Everest, have been published in Eric Shipton's *Mount Everest Reconnaissance, 1932* and in *The Times*.

THE SCIENTIFIC BACKGROUND OF THE 1953 EXPEDITION TO MOUNT EVEREST

By L. G. C. Pugh

The scientific assistance given to the 1953 expedition to Everest was greater in scope and effectiveness than that received by any of the previous expeditions. Since the last British attempt on Mount Everest in 1938, much new knowledge had become available which could be co-ordinated and applied to the many relevant problems. Methods of personal research had been developed and used with great effect during and after the 1939-45 war, and much had also been learnt about human efficiency in extreme environments. In addition particularly valuable information was derived from the physiological data collected on the British expedition to Cho Oyu in 1952. Apart from the climbing objective, this expedition had been designed to form a nucleus of climbers capable of attempting the ascent of Mount Everest in 1953, and a physiologist accompanied the party in order to study the effects of supplementary oxygen at high altitudes and problems of nutrition, acclimatization and equipment. Although the expedition did not succeed in reaching an altitude greater than 22,500 ft. (6800 m.), the information which was obtained, taken in conjunction with the experience of previous expeditions to Everest and in particular that of the Swiss party on Everest in Spring, 1952, which the Swiss generously made available, provided a basis for predicting the requirements for the 1953 expedition.

Acclimatization

The Cho Oyu party, like the Swiss on Everest, had gone straight up to high altitude within a few days of arrival in Sola Khumbu, and did not return to lower altitudes until after the attempt on Cho Oyu.

The party was insufficiently acclimatized, and lost a great deal of weight. They also suffered a high incidence of sickness due to diarrhoea and upper respiratory infections and it was thought probable that these infections were contracted from the local inhabitants and porters. Although considerable improvements in hygiene were obviously desirable and possible, it seemed unlikely that the introduction of infection into a party on its arrival in the Himalayas could be altogether prevented. It was therefore urged that the

forthcoming expedition to Everest should spend a month in the region in order to become acclimatized to altitude and to pass through the stage of initial infections before going on to the mountain itself. Experienced Himalayan climbers hold the view that little is to be gained by spending too much time below 14,000 ft. (4200 m.), when adaptation is required to altitudes above 18,000 ft. (5400 m.) and this view is supported by the observation that Sherpas living at Namche (about 12,000 ft.: 3600 m.) complain of headaches and shortness of breath in crossing the Nangpa La at 19,000 ft. (5700 m.). The plan was therefore adopted of spending three or four weeks on acclimatization, but instead of ascending by slow stages, the party should make short visits to 18,000 ft. (5400 m.) and return in the intervals to 13,000 ft. (3900 m.) to rest.

This plan proved extremely successful, and was thought partly to account for the greatly improved physical condition and freedom from illness shown by the party during the subsequent operations on the mountain.

Oxygen

Oxygen had been taken on every expedition to Mount Everest except the reconnaissances of 1921 and 1951. The equipment available to prewar expeditions was not, however, sufficiently developed to give conclusive proof to mountaineers of the usefulness of oxygen for their purpose, and they were not convinced by the arguments of physiologists. British parties in 1924 and 1935, and the Swiss in 1952, reached an altitude of about 28,000 ft. (8400 m.) by their own unaided efforts and were turned back by a combination of factors of which lack of oxygen was only one. Many mountaineers therefore thought (and some still think) that, given ideal conditions, Mount Everest could be climbed without the help of oxygen. Oxygen apparatus was however tried between 23,000 ft. (6900 m.) and 27,300 ft. (8200 m.) by Finch in 1922, by Odell in 1924, and by Lloyd in 1938. They each used Open-Circuit apparatus weighing in the region of 28 lbs. Attempts to use Closed-Circuit equipment made in 1935 and 1938 were a failure. Finch and Lloyd, using 2.2 litres (N.T.P.) of oxygen per minute claimed increased speed and reduction of fatigue, but their companions were not convinced that their performance was better on oxygen than their own without it. Odell using 1.0 litres per minute obtained little benefit from his oxygen and found he went better on the whole without it. The conclusion generally drawn from the prewar experience was that the weight of the apparatus very nearly counterbalanced any benefit derived from the oxygen.

The experimental work done on Cho Oyu provided data permitting a reassessment of the oxygen problem. It became clear that much more oxygen would be needed than had been taken before, and that flow-rates of 4 litres per

minute would have to be provided for. Although the net effect of oxygen on the rate of ascent of men climbing at 20,000 ft. (6000 m.) was small, it was predicted that, given enough oxygen, above 26,000 ft. (7900 m.) the rate of ascent would be about doubled because of the elimination of the need to rest every few steps to recover breath. Because of reduction of fatigue, men would be able to do a much longer day with the help of oxygen than without it. The successful use of oxygen would, however, depend on ability to overcome the practical difficulties of transporting adequate quantities to the higher camps.

A very large number of persons, both in science and industry, were concerned with the preparation of the oxygen equipment for the 1953 expedition. With regard to the choice of apparatus, the Open Circuit type was given first priority on the grounds of simplicity and reliability, and because Finch and Lloyd had already shown that it could be used successfully under mountaineering conditions.

With Open-Circuit apparatus the climber breathes a mixture of air and oxygen and exhales to the atmosphere. The partial pressure of oxygen in the inspired gas mixture depends on the altitude, the air temperature, the flow rate of oxygen and the minute volume of lung ventilation. At oxygen flow rates within the practical range for Mount Everest, that is between 2 and 5 litres per minute, a climber near the summit of the mountain inhaling 80 litres of air and oxygen per minute would be getting oxygen at a partial pressure equivalent to that of the oxygen in the atmosphere at about 22,000 ft. (6600 m.) and 13,500 ft. (4000 m.) respectively.

Closed-Circuit apparatus has two outstanding advantages. The climber breathes pure oxygen at a pressure even greater than the pressure of oxygen in the atmosphere at sea level. Secondly loss of heat from the body via the lungs in warming and humidifying the inspired air is practically eliminated. This factor was considered important, for it was calculated that fifty per cent of the total metabolic production of the body would be lost in this manner in men climbing at 28,000 ft. (8400 m.) at a temperature of -40° C. (-40° F.). Closed-Circuit sets are however more difficult to operate than the Open Circuit type and are liable to develop faults which cannot be identified and corrected under the conditions of use on a mountain.

Existing Closed Circuit sets designed for fire fighting and mine rescue are unsuitable for mountaineers as they have neither the endurance required nor the capacity to handle the very high volume of ventilation needed in climbing at high altitude. If Closed-Circuit sets were to be used, an entirely new design would have to be developed and it was doubtful if this could be done in the time available. However, on account of its great potential advantages an attempt was made to produce sets for trial purposes, and this was successfully accomplished.

The amount of oxygen sent out to Nepal was 193,000 litres. This figure may be compared with the 28,000 litres sent out in 1922 and the 30,000 litres taken by

the Swiss party in Autumn 1952. 17 of the 160 cylinders were found to have leaked on arrival; of the 150,000 litres left, one third was used for training and a small quantity for experimental purposes. About 16,000 litres were left over at the end of the expedition which would have been barely enough for a third assault. The climbers were carefully trained in the use of their oxygen equipment. They wore their masks for part of each day on the approach march; and training ascents were made with both the Open and the Closed-Circuit sets. They also learnt to sleep comfortably wearing lightweight masks and breathing one litre of oxygen per minute.

The Open-Circuit sets proved satisfactory apart from a few minor technical difficulties which were overcome and some trouble with ice formation round the mask and its connections. There was no appreciable resistance to breathing even at high work rates (respiratory resistance has always been one of the chief difficulties encountered in oxygen apparatus used on Everest). 4 litres of oxygen per minute were needed for strenuous work, but men moving slowly behind a leader making tracks and cutting steps found 2 litres adequate. Hillary and Tensing used 3 litres per minute on their final climb to the summit; this was less than had been intended. They climbed at 630 ft. (194 m.) per hour from 25,850 ft. (7800 m.) to 27,300 ft. (8200 m.) in a track prepared by their support party. The final climb from the top camp (27,900 ft. = 8350 m.) to the summit, however, took five hours.

The Closed-Circuit sets were used successfully under the supervision of Bourdillon, who had been associated with their construction, but even he found difficulty in tracing faults on the South Col. They were used by him and Evans on the first assault and they climbed nearly 3000 ft. (900 m.) from 25,850 ft. (7800 m.) to 28,700 ft. (8700 m.) and back in a day. From 25,850 ft. (7800 m.) to 27,300 ft. (8200 m.) they averaged 930 ft. (300 m.) per hour making their own track—this, for men carrying 50-lb. loads, must be accepted as an Alpine standard of performance. On the last 700 ft. (215 m.) after changing soda lime cannisters, Evans' set was defective, but the fault was not identified. Above 26,000 ft. (7900 m.) the fact that the inspired air was warm and moist proved a great advantage, though at lower altitudes the Closed-Circuit sets were too hot.

The most important effect of oxygen was reduction of fatigue and high altitude deterioration. Climbers using oxygen found they could do a much longer day without becoming exhausted. Oxygen at night induced sleep and warmth, and promoted recovery from fatigue. All the climbers commented on the great subjective benefit experienced while climbing; they were able to enjoy climbing again and take an active interest in their surroundings. Climbing rates were not significantly improved up to 22,000 ft. (6600 m.) but above that altitude the improvement in climbing rate became increasingly apparent. Sudden failure of

the apparatus while climbing caused severe breathlessness and weakness; slow failure was apt to pass unnoticed.

No ill effects were noticed on removing the mask, provided the climber first rested and recovered his breath. Hillary removed his mask on top of Mount Everest and was able to take photographs and set the shutter speed of his camera. After ten minutes he noticed his movements were getting clumsy and his thought processes muddled, so he replaced his mask.

Bourdillon reported some loss of tolerance of altitude after wearing Closed-Circuit set for a prolonged period, but there was no evidence of this in the case of Evans.

Nutrition

Himalayan expeditions have in the past usually subsisted on local foodstuffs supplemented from bulk stores taken out from England (or purchased locally). Below 10,000 ft. (3000 m.), rice, dhal (a type of lentil) and atta (stone-ground wheat flour) are staple foodstuffs, and above 10,000 ft. (3000 m.) potatoes and tsampa (stone-ground parched barley). Eggs and chickens are available in limited numbers up to about 13,000 ft. (3900 m.) and yak and sheep can be purchased at 12,000 to 14,000 ft. (3600 to 4200 m.), and sent up on the hoof to 18,000 ft. (5400 m.).

Cooking is done over wood fires up to 18,000 ft. (5400 m.). Above that, paraffin stoves are used, and all water has to be obtained by melting snow. Owing to the reduced boiling point of water, pressure cookers are essential if normal meals are to be provided above 18,000 ft. (5400 m.). It is a curious fact that mountaineers have only recently come to accept pressure cookers as an essential part of their equipment. As recently as 1951 pressure cookers supplied gratis by the makers were discarded before the approach march.

Most of the food for the day on a Himalayan expedition is consumed at two meals. These are breakfast and supper, and as the daily intake of calories is 4000 to 4500—at least at the lower altitudes—these are very large meals. The strange and bulky diet, the very large quantities of tea (up to 7 pints) consumed, and the serving of curry each evening place a considerable strain on the digestive system. Digestive disturbances are relatively common; and cases of chronic diarrhoea occur, which are probably of infective origin but are kept going by an unsuitable diet. The majority of climbers, however, eventually become completely adapted to the above diet and do well on it.

At altitudes above 18,000 ft. (5400 m.), fresh problems arise. The production of cooked meals and adequate quantities of fluid becomes increasingly difficult. Diet becomes unpalatable and monotonous. The food intake of the climbers, for

this reason, and also because of the effect of altitude on the appetite, becomes progressively reduced. Shipton, on the 1935 expedition, obtained records of food consumed between 18,000 ft. (5400 m.) and 21,000 ft. (6300 m.) and the calorific value worked out at between 1500 and 2000 calories.

Above 18,000 ft. (5400 m.), the food preferences of climbers undergo a marked change. They develop an increased appetite for sugar and, if sufficient quantities are available, may consume up to 14 oz. per day. The sugar is taken mainly dissolved in beverages; and these, in spite of their very large sugar content, seem to taste less sweet than at sea level. Climbers, while unable to eat the dull and unpalatable food provided, often feel they would enjoy well cooked food such as they would eat at home. Some men develop cravings for foods that are usually not available, such as salmon, sardines and tinned fruit.

Owing to the inefficient cookers and shortages of fuel, parties on Everest and other high mountains have usually had difficulty in satisfying their fluid requirements and there is much indirect evidence in Himalayan literature that parties have suffered from dehydration. It is suggested that the sensation of thirst, like the appetite for food, may be impaired at high altitude, and that men may suffer less from thirst than they would with a corresponding fluid shortage at sea level.

On the expedition to Cho Oyu in 1952, the energy value of the diet on the approach march was about 4300 calories. Intake fell to about 3000 calories at and above 18,000 ft. (5400 m.). This was a higher intake than that reported by Shipton, probably because ample supplies of sugar were available. Fluid intake was found to be between 3 and 4 litres per day. Inconvenience and sometimes hardship was caused by shortage of essential stores due to pilfering and over-consumption of favourite items and the difficulty of distributing and sorting the bulk rations.

In preparing the 1953 expedition, it seemed wise on general physiological grounds to avoid the sudden change to a strange and bulky diet usual at the beginning of an expedition, and to provide a more varied and palatable diet than is available to a party living off the country. Improvements were desirable in the methods of sorting and distributing rations, and in the arrangements for cooking and melting snow at high altitudes. At the high camps where economy of weight is essential, a special ration was needed which would provide a basic diet consisting largely of sugar, as well as catering for individual food preferences. To meet these requirements it was decided to break with tradition and use composite rations of the type used in the armed forces for supplying troops operating in isolated groups or small units. Special cookers were designed to ensure an adequate supply of water at high camps; and pressure cookers were provided to make possible the cooking of meat and potatoes at and above the Base Camp (18,000 ft. = 5400 m.).

The organization of the packing of the rations was undertaken by the army, and many of the items were made available from army stocks. The detailed composition of these rations has been published in the official account of the expedition, "The Ascent of Everest" by Sir John Hunt. In brief, two types of ration were taken:

1. A general purpose composite ration packed in 14 and 28 man-day units. Palatability and variety were achieved by the use of tinned foods combined in a different menu for each day. Economy of weight was not a vital consideration in planning the general purpose ration, since there would be no shortage of porters in Katmandu at the time of the year when the party would be setting out from there. It was planned to supplement this ration with rice and potatoes purchased locally, and later with fresh meat.

2. An assault ration for use above 20,000 ft. (6000 m.). In this, every effort was made to economise on weight and bulk. No tins were used and most of the foodstuffs were vacuum packed. By vacuum packing a soft item like a bag of granulated sugar is reduced to a hard rectangular block, which becomes soft again once the vacuum seal has been broken. This method of packing offers great advantages to all expeditions on which economy of weight and bulk are important.

In order to cater for the personal idiosyncrasies shown by men at very high altitude, each climber was asked before the expedition to select one or more foods that he thought he would be able to eat at the high camps. These were packed in bulk under the title of luxury boxes. It was planned that each climber, before going high, should reject such items as he did not require from the "assault" ration and substitute the foods of his own choosing from the luxury boxes. At Base Camp the assault rations were further lightened by removal of superfluous protective wrappings and rejection of certain unpopular items such as pemmican and service biscuits. The composition of the modified assault ration was as follows:

Rolled oats ..	2 x 1 oz. packets	Boiled sweets	1 x 2 oz. packet
Milk powder.	2 x 3 oz. packets	Salt	2 x 5 ½ gm. dispensers
Sugar	4 x 2 oz. packets	Cocoa	1 x 1 oz. packet
Jam	1 x 2 oz. packet	Tea	1 x 1 ½ oz. packet
Sweet biscuits	2 x 3 oz. packets	Soup	1 x 2 ¼ oz. packet
Cheese	2 x 1 oz. packets	Lemonade powder	2 x 1 oz. packets
Mint bar or		Gross weight = 4 lb.	
banana bar.	2 x 2 oz. packets	N.B. 1 oz. = 28.35 gms.	

The above rations proved on the whole satisfactory.

The general purpose composite rations were eaten at a greater altitude than had been anticipated (up to Camp IV at 21,200 ft. 6400 m.), and were supplemented with yak meat, mutton and potatoes. The calories value of the diet eaten in the Cwm. between 20,000 ft. (6000 m.) and 21,200 ft. (6400 m.) was calculated to be about 3800 calories per day, compared with 3000 calories the previous year.

The greater food consumption in 1953 as compared with 1952 is explained by better acclimatization, the provision for normal cooking at high camps and the improved palatability and variety of the food.

During the assault, climbers ate most of the sugar and milk in their assault ration but otherwise subsisted on items such as sardines, salmon, cheese, tinned fruit and French saucissons from the luxury boxes, and Vitawheat, Knäckebröt and honey salvaged from the Swiss expedition of the previous year.

Fluid and salt requirements were well met, and there was no evidence of significant fluid deficiency having occurred even during the assault phase.

It was generally agreed among the five men who had taken part in the 1952 as well as the 1953 expedition that the average level of fitness among the party at all stages of the expedition was higher in 1953 than the previous year. Objective evidence in support of this view is provided by the records of body weight. In 1953 the average loss of weight in the first month after reaching Thyangboche (13,000 ft. = 3900 m.) was 2 lb., whereas the average loss of weight over the corresponding period in 1952 was 11 lb. During the second month spent for the most part above 20,000 ft. (6000 m.) the average loss of weight in five men for whom records are available was 4 lb.

Climatic Considerations

On the expedition to Cho Oyu in 1952 a study was made of climatic conditions in relation to problems of protective clothing and equipment. The expedition experienced a wide range of climatic conditions representing many recognised types of climate, for example, dry heat, moist heat, temperate alpine conditions, wet cold, and dry cold. The snowline from April to May extended down to about 17,500 ft. (5300 m.) and it was only above that level that special protective equipment against cold began to be needed. The special features of the climate above the snow line were fairly intense cold at night and combination of low air temperatures with high radiation temperatures during the day. Weather conditions were variable: there were snow storms alternating with fine periods, but even in fine weather the onset of mist and snow in the afternoon was usual. Minimum temperatures at night at 18,000 to 20,000 ft. (5400 to 6000 m.) were variable and ranged from -13° to -20° C. ($+8.6^{\circ}$ to -4.0° F.). Sun temperatures of 69° C. (156° F.), measured with the black bulb radiation thermometer were observed in

association with shade temperatures near freezing point. High winds were occasionally met with, but not of the force to be expected on ridges and cols above 22,000 ft. (6600 m.).

Although these conditions were not severe by comparison with conditions to be expected above 22,000 ft. (6600 m.), the climbers complained of being cold in their sleeping bags and suffered from cold feet while climbing. It seemed desirable that the equipment should be brought into line with modern technical developments in the design of protective equipment for cold conditions, due consideration being given to the special requirements for mountaineering which are above all economy of weight, freedom of movement, and adjustability to suit variations in metabolism and in environmental cooling power.

With regard to the question of cold on Mount Everest, no records of temperatures were available from previous expeditions for altitudes above 24,000 ft. (7200 m.). Balloon observations made at hill stations in India indicated that minimum temperatures of -40°C. (-40°F.) and wind velocities of up to 100 m. p. h. were to be expected at 28,000 ft. (8400 m.). The fact, however, that mountaineers on Everest had not suffered more casualties from cold than they did, suggested that in the fortnight before the monsoon, temperatures were higher than at other times. By extrapolation from the Cho Oyu data, assuming a lapse rate of 3.5°F. per 1000 ft., minimum night temperatures at the South Col at 26,000 ft. (7900 m.) would be between -25°C. (-13°F.) and -32°C. (-26°F.), and at 28,000 ft. (8400 m.) between -29°C. (-20°F.) and -36°C. (-33°F.).

Wind velocities of 100 m. p. h. would of course make climbing operations impossible, since in a wind of such velocity even walking on level ground is impossible.

For climbing during the day in fine weather, climbers would have little difficulty in keeping warm as air temperatures by day would be considerably higher than temperatures at night given above, and they would be gaining a large amount of heat by radiation from the sun. Conditions would, however, become extremely dangerous if climbers at very high altitudes were overtaken by bad weather or if they were benighted without their sleeping equipment.

Protective Equipment

A single cotton-nylon fabric, chosen after extensive laboratory tests, was used in the construction of tents and wind-proof clothing. The outer windproof smock and trousers were greatly improved in design in the light of experience gained in 1952, and by making use of ideas from Arctic practice. Particular attention was paid to the fit of these garments—this had been conspicuously at fault in 1952. The main insulating garments were the quilted down jacket and trousers which were similar to those used by British and Swiss parties the previous year. Silken

inner gloves, woollen mitts and outer windproof mitts of ventile cloth were provided for protection of the hands, and a number of pairs of very large Swiss down mitts were taken for the assault parties. Special boots were provided for use above 20,000 ft. (6000 m.). These were of an entirely novel design, having relatively thin microcellular rubber soles and very thick kapok stuffed uppers to provide the required amount of insulation. Both the inner and outer coverings were waterproof so that the boots conformed to the double vapour barrier principle. Much attention was paid to economy of weight since metabolic experiments have shown that one pound of weight carried on the feet is equivalent to four pounds carried on the back.

These boots were not entirely successful because they did in fact get wet (owing to tears in the outer covering) and this increased their weight considerably. In spite of the kapok being damp, however, the insulation afforded by the boots proved adequate for the conditions encountered.

The total weight of the above clothing, including boots and gloves, was 17 lb., compared with 23 lb. for a corresponding Arctic clothing assembly.

Many different patterns of tent were taken. In addition to the British tents, American, French and Swiss patterns were taken for trial purposes, as well as a small experimental tent in which the normal tent poles are replaced by a spring steel frame which keeps the tent fabric under tension as in an umbrella. The essential properties required in Himalayan tents are as follows:

They must be quick and easy to erect and strong enough to resist high winds; very strong sewn-in ground sheets are needed to resist tearing when the tents are pitched on rock and ice; they should be large enough to provide reasonable comfort for the number of occupants they are designed to shelter; ventilation is very important on account of the intense solar radiation during the day which raises the temperature even in well ventilated tents to about 80° F. (27° C.); for this reason Himalayan tents should have entrances at both ends. Double walls for protection against low night temperatures are not necessary if the sleeping bags and mattresses are adequate. A method of closing the entrances which will keep out drafts and wind-driven snow is required and can be achieved by providing sleeve entrances as used in Arctic tents. Economy of weight is an important, but not an over-riding consideration, except in assault tents.

Of the tents used on the present expedition the modified Meade tents were the most popular and were used on the South Col and top camp. These are extremely easy to erect even in strong wind. The other general-purpose tent, the pyramid tent, was a modification of a pattern developed in 1943/4 for snow and mountain warfare, and though very light in weight relative to the number of men accommodated, suffered from the disadvantage of being difficult to erect in a strong wind. It was unfortunate that one of these tents was taken to the South Col.

Sleeping bags of Canadian, New Zealand and British manufacture were used. The important points in designing sleeping bags for the Himalayas are as follows:

An outer and inner compartment is required to cover the wide range of climatic conditions encountered. About 8 lb. of down are needed to afford sufficient protection for temperatures down to -40°C . (-40°F .), and the inner bag should weigh about 3 lb. The bags should be long enough to pull over the head and wide enough to allow a man to turn over inside the bag, to which end a slippery nylon lining is an advantage. These requirements were met in most of the bags supplied, but the briefing of the makers was in some instances incorrect.

Sleeping mats were of the inflatable type. An ordinary commercial pattern was taken for use up to Base Camp. At Base Camp and above, special mats were provided, based on a design developed during the war which gives better insulation and eliminates the characteristic bouncing effect experienced by a person lying on the ordinary type of mat when he turns over. The special mats had a double layer of inflatable tubes which were constricted at the ends, thus buffering sudden displacements of air from tube to tube. These mats provided good insulation from the ground and were very comfortable. Some climbers had trouble with punctures and leaking valves.

The description of the climbers of their experience on the South Col indicates that they suffered rather severely from cold. This was to be expected in view of the fact that they left behind the inner components of their sleeping bags in order to save weight. Had temperatures of -40°C . (-40°F .) instead of -25°C . (-13°F .) been encountered, their situation would have been dangerous.

The ascent of Mount Everest is another milestone in the progress of man's conquest of his environment. It has been made possible by the integration of many factors: mountaineering skill, leadership, the experience of previous expeditions, meticulous organisation and planning. The role of science has been to reduce the stresses imposed by an extreme environment, to increase the climbers' ability to maintain themselves under extreme conditions and so preserve a state of health and efficiency sufficient to enable them to achieve their object.

SHERPA TRAINING

By Arnold Glatthard

When Dr. B.C. Roy, Chief Minister of West Bengal, came to Zürich in July 1953, it was with the intention of consulting the Swiss Foundation for Alpine Research as to the best method of maintaining the flood of honours which streamed after the victorious British Everest Expedition of 1953 in even greater measure than the famous snow-plume from the peak and of utilising them for the alleviation of the sufferings of the struggling populace. He was first of all faced with the task of solving a social problem. The comparatively large number of Sherpa nationals, who came originally from Tibet but emigrated to West Bengal via Nepal, had for some considerable time acted like the pointer of a balance. If a wave of despair were allowed to spread among the Sherpas it would have exposed the peoples of the northern hill country to severe poverty and profound misery, whereas more kindly thoughts would act as an electric spark and would instill confidence and a fighting spirit into the more vigorous Sherpas, just as the föhn presages better weather to come.

Before the conference opened, which was fixed for the day after he arrived in Zürich, a touch of föhn was provided by the Foundation for the edification of the Indian visitor. A few notes were specially prepared and laid before him, forming the key-note to the ensuing discussion. This "Primary Draft" ran as follows¹:

"It is an excellent idea to include mountaineering in the physical fitness programme of Indian students. The intellectual youth will certainly have a say in the future development of mountaineering in the Himalaya and Karakoram.

"A course of preparatory character should include lectures on geography, morphology, geology or physiology, climatology suitable as additions to the curriculum of the individual student. More technical studies should refer to map-making and map-use, to mountaineering outfits and nutrition problems, first aid, and last but not least to mountain craft in general, i. e., the technique of mountaineering on untrodden country, especially rock climbing, ice craft and combined work on the real mountains.

¹ Quoted here in its original English form, as presented to Dr. Roy.

"Whereas teaching classes of students could include large numbers for indoor work, mountaineering itself would have to be organised in small classes of three to four pupils and one instructor. Of great importance is the selection of proper training areas enabling the chief instructor to rotate the classes from the various sites and to give each day enough appeal so that the pupils not only learn, but enjoy being taught.

"It is obvious that the chief instructor of the Institute¹ and his right-hand men would need a thorough education and more than basically-founded knowledge of mountain craft. In order to give students full value the instructors could not be given too much care during their own training. It would therefore be an excellent idea to let them pass the Swiss training of professional mountain guides.

"Especially during training on rock and ice, and even more during training climbs on real mountains, it seems essential to safeguard the pupils from danger by assigning to each small group a guide who would be responsible for the adherence to the proper rules of mountain craft.

"It would seem a very important side-line of such a mountaineering institute to lend a hand in the general development of the Sherpas. Till now they have usually been considered as being fit to do the lion's share of hard work without being accepted as social equals by the various European nations sending expeditions to the Himalayas. Improving the Sherpas professionally would raise their self-respect; they would grow in personality, and this certainly would improve their standing both as individuals and as a class of craftsmen. The development of exploration in the Himalayas and the Karakoram largely depends on such improvements. These people, who have all been brought up the hard way, ought to find a tremendous relief in seizing the outstretched hand of India. It could not be a better proposition for the Swiss than to help the Indian authorities to find the right way to achieve this purpose."

It was clear that as regards the visitor from Bengal the right note had been struck. His fellow members of the conference were quite prepared to appreciate his sociological motives and he had no need to doubt their capacity for organising a school of mountaineering. One had only to look out of the window in order to be aware of the presence of mountains, ridges and glaciers.

The Zürich conference was between friends and ended as it had begun, in perfect harmony.

As representative of the Foundation and the guest of India I was able before long to visit Darjeeling and thoroughly to inspect the training ground in the Ratong-Kabru district with Tenzing and Major Jayal. The impressions which I

¹ The subject of the discussion should be the formation of the *Himalayan Mountaineering Institute Darjeeling*.

received on the spot were of material assistance in deciding the policy of the Foundation, which resulted in the invitation of my new-found friends, Jayal and Tenzing, together with six other specially selected Sherpas, to come to Switzerland for a few months as the Foundation's guests.

In due course they arrived, and their shy smiling eyes sought out and found that which was of fundamental importance to them. We were dealing not only with the training of beginners, for at the same time my pupils had to learn how to pass on their acquired knowledge to other pupils.

Thanks to the friendly co-operation of the S.A.C. and the Valais Government, the future leaders of the Himalayan Mountaineering Institute Darjeeling, Major N.D. Jayal and Sirdar Tenzing Norgay Sherpa, were enabled to take part in the mountain guides course in Champex from June 4th to 27th, 1954. As well as the above mentioned the following Sherpas attended my Mountain School at Rosenluis from July 19th to September 6th: Ang Tharke, Gyaltsen ("Mickchen"), Da Namgyal, Ang Temba, Nwang Topgya and Nwang Gombu.

An indication of the versatility of the training provided by the School is that it can be likened to the ice and rock technique taught by the chamois to their young!

a) General Training: Short walks. Getting acquainted with the terrain and accustomed to the new surroundings. Use of the rope. Various knots and roping up on rocks and on glaciers, 2, 3 and 4 on a rope. Management of the rope.

b) Ice craft: Step-cutting, single row and double row; cutting across slope and straight up, zig-zag; management of ice-axe; cutting handholds; cutting steps up and down.

Use of Crampons: Proper method of walking, balance, setting down and lifting up of foot; position when at rest; learning to walk along an edge; going up and coming down. Description of crampons and their advantages and disadvantages on ice and snow. Use of crampons on very difficult ground.

Belaying: Belaying with the axe; belaying from steps; belaying on crampons; belaying while step-cutting. Modern equipment: Ice-pitons, ice-pipes; ice-blocks for self-belay. Climbing up and down: use of axe, traversing.

Roping Down on ice and snow.

Ice Climbing.

Crossing of Glaciers: Fixing a route; crevasse lore; ice-avalanches, snow-bridges, sounding for crevasses, crossing crevasses, bergschrunds, precautions.

Rescue from Crevasses: Preparation for rescue work and procedure. Rescue work: first direct pull; by pulleys; rope footloop or stirrup; getting alone out of a crevasse on a single rope.

Snow craft: Choice of route in snow, hard-frozen and soft snow. Avalanches, cornices; proper method of surmounting and breaking off a cornice. How to

glissade under control, uncontrolled glissading and how to deal with it. Descent of couloirs. Heel work on steep slopes.

c) Rock Climbing and Basic Training: Use of mountain equipment, packing of rucksacks, securing ropes and articles of clothing, keep a tidy rucksack.

On grass and scree slopes, easy rocks, slabs. Principles of climbing; use of rope-soled (and other) shoes; exercises in balance, foot and hand holds, chimneys, cracks, slabs, faces, ridges, traverses, the human ladder (giving a shoulder), buttresses, overhangs, crawling along ledges, climbing up and down, hand traverses, ledges.

Belaying on Rock: Belaying the leader, job of the second and third on the rope; management of the rope; self belay; rock-pitons, shoulder and knee belays; waist belays on the doubled rope; fixed ropes, descending on fixed ropes, use of karabiner.

Roping Down: Securing the rope before roping down: rock anchorage, applying and fixing of rope-slings; choice and use of pitons. Braking with the shoulder; karabiner and thigh loops. Various roping-down manoeuvres: overhangs, roofs, slabs, traverses, roping down on the doubled rope; descent on a fixed rope; throwing down and pulling back of the "abseil" rope. Precautions when roping down: testing the rope on the belay: how and where is the party situated: method of roping down, method of braking and belaying. Belay of leader while descending.

d) Rock and Ice Climbs Undertaken: Rock: Klein Wellhorn, Tannenspitze, Kingspitze, Klein and Gross Simelistock, Gspaltenhorn, Klein and Gross Gelmerhorn, Dossenhorn.

Ice and Snow Climbs: Wetterhorn, Rosenhorn, Mönch, Jungfrau, Gross Fiescherhorn, Hinterfiescherhorn, Finsteraarhorn.

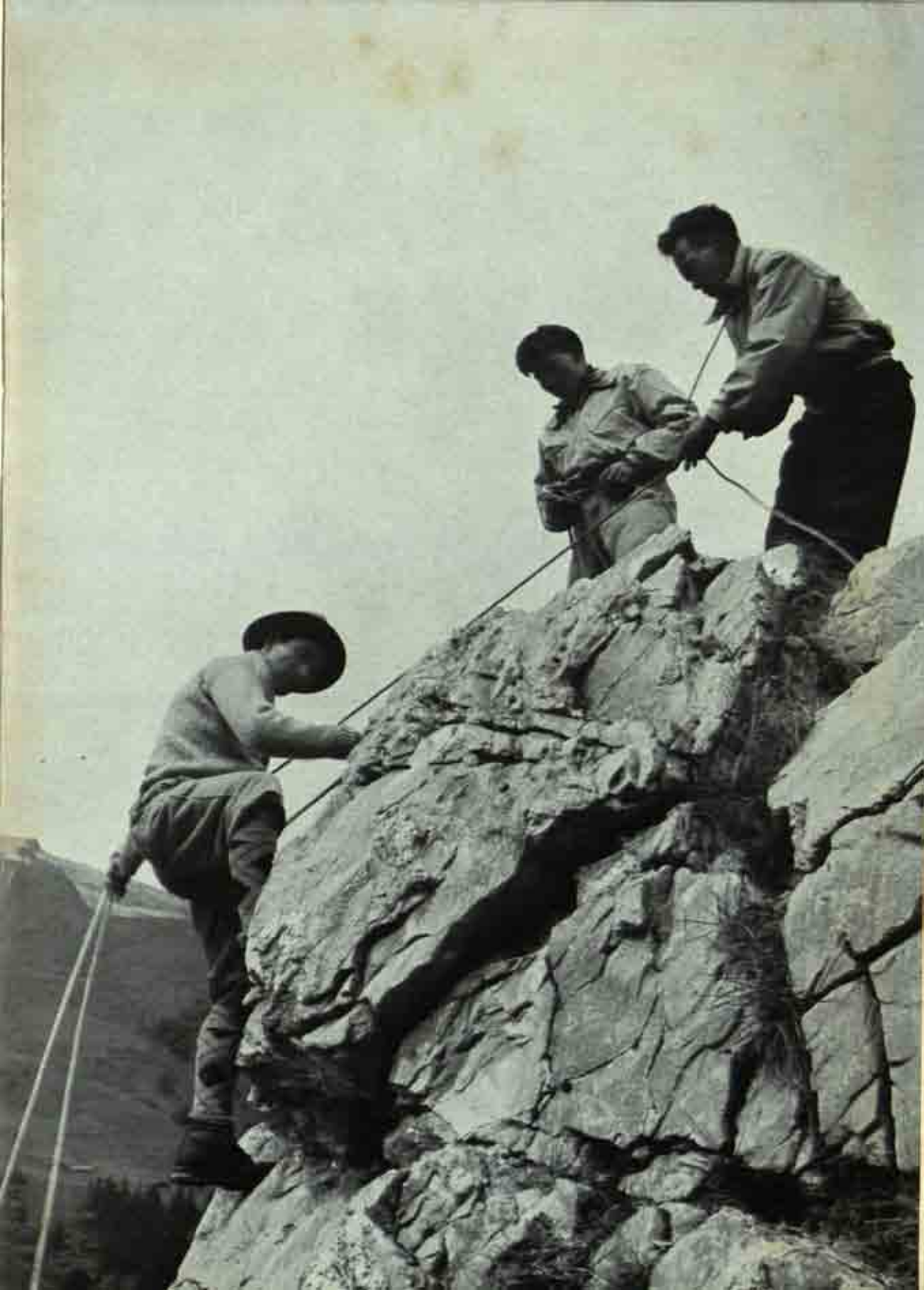
e) Theoretical Training: Demonstration of rescue work and first aid in the mountains with latest equipment. General teaching as applied to pupils of the Mountaineering School. Easy and difficult climbs undertaken with our guests. Packing of provisions, organisation, touring.

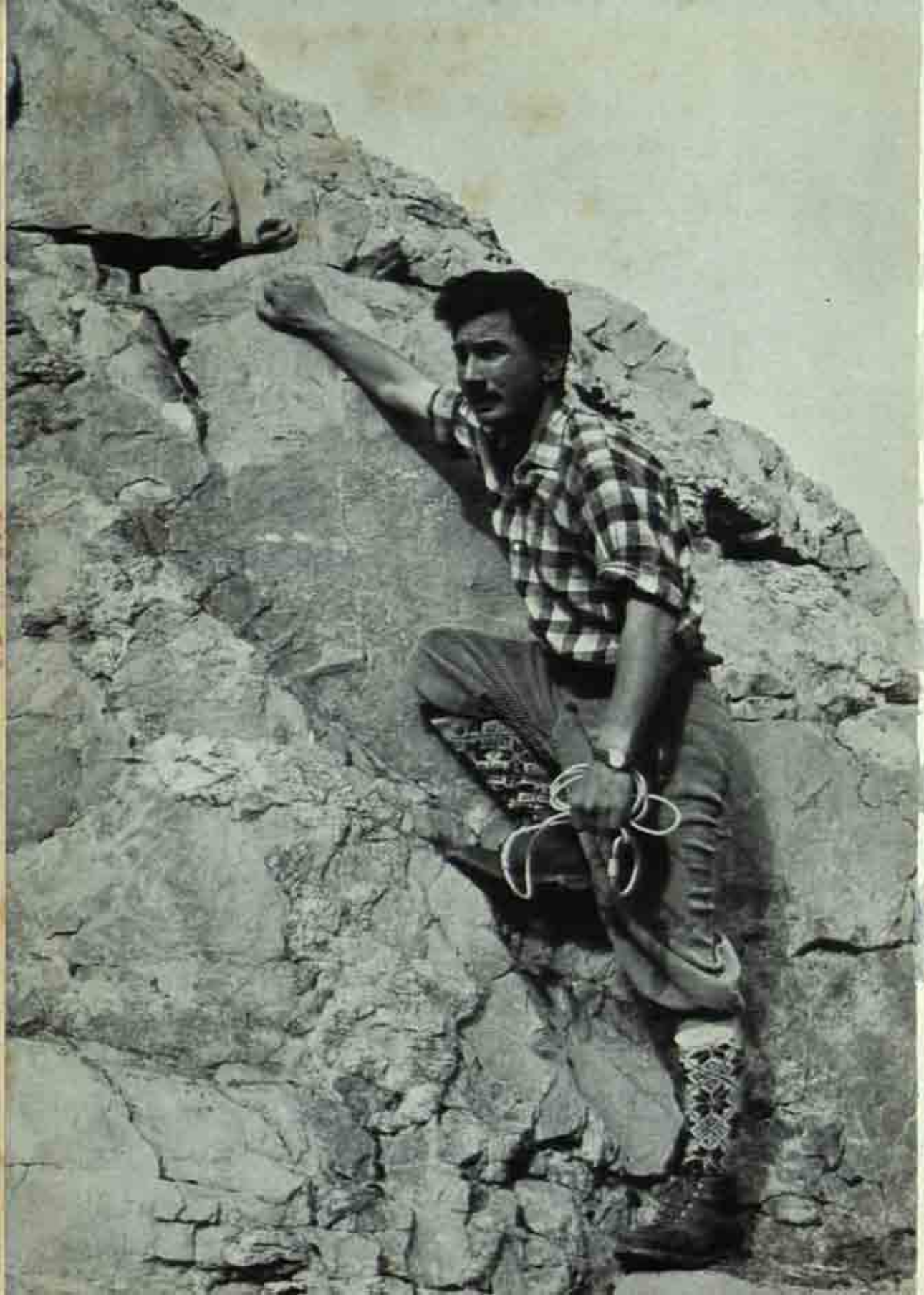
f) Organisation of the Courses:

Accidents: Ang Temba sustained a bad cut on the head by stone-fall on the Gross Simelistock and had to receive medical attention in Meiringen. He was back at work again two days later. No other accidents.

Plate 49: Training ground of the Swiss Mountaineering School at Rosenlaui. Tenzing Norgay is in the thigh loop preparatory to roping down. The karabiner is fixed to a small loop attached to the doubled rope. Roping down with a "twisted rope" is one of the methods taught during the course.

Plate 50: Two young Sherpas under instruction in a steep snow couloir. Careful balance is required, the heels being dug hard into the snow while descending.





Food: Good and plentiful in Rosenlaui. In the huts food was provided by the Foundation. Additional foodstuffs also provided by the Foundation.

Living Accommodation: Head Quarters at Rosenlaui, storehouse for the Mountain School. Engelhorn Hut, Dossen Hut, Gspaltenhorn Hut, Oberaarjoch Hut, Finsteraarhorn Hut, Gelmer Hut, Jungfrauoch Tourist House.

Equipment: Equipment and clothing was provided by the Foundation and was taken back again in part at the end of the course. Expendable material such as pitons, alpine line, ice-pitons and karabiner were charged up to the Mountain School. Both equipment and clothing were suitable and of very good quality.

In my opinion the course was extremely successful. In spite of the bad weather throughout the summer of 1954, it was possible to carry out the maximum of training with the Sherpas. The simple mountain spirit of Rosenlaui, and the presence of the skilled and unskilled climbers taking part, helped the Sherpas to see and learn much, in fact they merged quite imperceptibly into the activities of the School.

I am fully convinced that when the Sherpas get an opportunity to put into practice what they have learned and to add to that knowledge, the pioneer work to which I lent my full support will have proved its worth.

Plate 31: Crampon Practice. Descent of hard granular ice; the feet placed flat with flexed ankles. Glatthard is correcting the body balance and the ankle movement.

Plate 32: The "Principal" of the Himalayan Mountaineering Institute, Major N.D. Jayal, is an attentive pupil at the Swiss Mountaineering School, Rosenlaui.

THE HIMALAYAN MOUNTAINEERING INSTITUTE

By N. D. Jayal

It has very often been said of Indian University education, among other things, that the students have no outside interests, that the education is too academic and that the students have no ambition except to get a job. A very interesting and circumspect article appeared in the 20th March (1955) issue of *The Statesman* entitled "The Indian University man; a study", by Jonathan Boswell.

I feel *The Himalayan Mountaineering Institute* here can also assist in filling in the crevasses in our educational system. A lot has been written about mountaineers and mountaineering but nothing, to my knowledge, about how it can contribute towards the enhancement of our education. The most glaring flaws, and it is not typical of Indians only, in the make up of our youth as I see them, apart from those mentioned earlier, are (a) too much of a competitive attitude towards others rather than an effort to compete with and improve on their own performance and (b) an accent on trivial and petty things in daily life.

In brief, what we do here is to give the students a week of thorough theoretical training in all subjects connected with mountains and mountaineering. This includes high altitude physiology, plant and animal life, principles of geomorphology, meteorology, geology cartography, mountaineering first aid technique and so forth. This is followed by an eight day trek to the climbing training area, six days rock climbing training, six days of ice and snow technique, followed by the assault on a 19,000 to 20,000 ft. peak combining the three. After this an eight day trek back by a different route is followed up by three days of tests and winding up at Darjeeling. If a tour like this was all we were to achieve here there would be nothing unique or worthwhile about this institute. A tourist organisation could arrange almost all that. I believe the answer lies in laying the correct emphasis and creating an atmosphere conducive to men and mountains meeting under conditions from which the men come away having greatly benefitted themselves.

In the first phase of their training at Darjeeling we emphasize the following:

Scientific aspect: By teaching all above-mentioned scientific subjects as mentioned earlier that have anything to do with mountains and showing their relation to one another, we will eventually be able to shape a "Himalayan mountain-

craft". We know that the plant life in the mountains is related to the geology of the area. The animal and bird life are dependent upon climatology and forests of the Himalayas. These and the rivers and glaciers dictate the lives, habits and customs of the people that live there. So we see that all these are correlated. Individually all these subjects have been well studied; research on them has been carried out and there exist various scientific bodies in India to deal with one or more of them. But what we wish to do is to blend as much of all these as concerns the Himalayas with the technical training in mountaineering and living in the mountains. I maintain that by assuring this background we combine strong purpose with pure love and passion for the mountains and for climbing. I hear we are also to get assistance from the Council of Industrial and Scientific Research in facilities for scientific research.

Cultural aspect : One of our objects when the new building comes up is to have a museum with various sections. Some of these will be filled with exhibits that show how people live in this long Himalayan Chain; their agricultural implements, their dress, their social customs, their crops, their religious customs and their arts and handicrafts. All these will give the students a better understanding of the area in which they travel.

The second phase of the training is the time away from Darjeeling. During this period apart from technical training in mountaineering and ascents we emphasise training in self reliance, leadership and discipline.

Self reliance : During the studies at Darjeeling, all the planning and purchase of food stuffs, making up of loads and so on is done by the students under supervision and advice. Some of the subjects are taught by the students themselves and some by a form of discussion—a seminar for which books and pamphlets are given to students to study beforehand. On the trek the issue of rations is supervised by a team composed of two students and one member of the staff. On the actual mountain, after they have attained certain proficiency, the students are given opportunities to lead on the rope. This would be more frequent on the advanced courses.

Leadership and discipline : I am certain that students who have been with us for six weeks or so will go away better citizens and more mature than when they came to us. I do think that to counter indiscipline it is more lasting and effective to replace the desire to "make a mark" or "feel important" (the root cause for lack of discipline) by a substitute—by sublimation rather, than by regulations and regimentation. This substitute is the self-discipline, imposed on mountaineering treks and expeditions, and by living in a restricted society under hardship, having to be careful and exercise concentration because somebody else's safety or comfort depends upon it, when it would be much less irksome to be relaxed and careless.

We do not intend simply to produce athletes or gymnasts but to help students to become whole in their make-up and well-balanced in their outlook. One of the greatest advantages mountaineering has over other sports is that there is no danger of "playing to the gallery"—no question of exhibitionism. Most important and effective will be the impact on the students, conscious or sub-conscious, of the symbolic aspect of mountaineering: the very fact of rising higher and higher, surmounting obstacles. As I wrote in an earlier article on Kamet: "On a mountain a mountaineer is always the gainer even he does not reach the summit. He has at least gained in the qualities which danger and nature in the raw sharpen, and an understanding of the character of sacrifice, physical exertion almost beyond human endurance, and above all the comradeship of one's fellowmen." I do not maintain that it is only mountaineering that will accomplish this. It can be sailing in the oceans, exploration in the forests and polar regions and such-like adventures where the difficulties that have to be engaged are undoubtedly bigger and stronger than man. As such a man can have "Victory without pride" and "Defeat without despair", unaccompanied by the psychological consequences normally attendant upon victory and defeat when competing with fellow human beings.

By inspiring those that come to them with all their traditions in Indian history and culture, by humbling them with their vastness and power, satisfying them with their grandeur and beauty, trying their manhood with their glaciers and peaks, challenging their spirits with their inviolate secrets and showing that God exists not only in the beauty of his creations in nature but also in the spontaneously noble actions of their companions, the Himalayas will forge men who, when they came back to everyday life, will do so with a changed perspective, ignoring all the petty and trivial and unimportant things that normally take so much of their energy and time and concentrating on problems that really matter.

Mountains have inspired and raised to great emotional heights men of science, thought and letters like Dante, Rousseau, De Saussure, Goethe, Wordsworth, Keats, Ruskin, Nietzsche, Pope Pius XI, Tagore, Nehru and others. I feel that students of the Mountaineering Institute can also be similarly stimulated to a certain degree if they are of a sensitive nature embellished with idealism, which fortunately most Indians are. I think it would be quite a creditable achievement if even 25% of our students have been so animated and exercised in their characters and powers of leadership that they return to the mountains on their own or with their companions, with an attitude of mind in which they feel "physically small and spiritually great", and the realization that it shall profit a man even if he lose the whole world and find his own soul.

MOUNTAINEERING IN TURKEY

By Lâtif Osman Çikigil

The length of Turkey's frontiers is about 6200 miles and its area, excluding the lakes, about 294,500 square miles. Its principal features are mountainous.

The tectonic structure of Anatolia (Asia Minor) is determined in the west by the spurs of the great Asiatic mountain chains, in the north by the Pontic and in the south by the Taurus Alps.

The northern chain reaches a height of 12,915 ft. (Kaçkar) and the southern Taurus mountains 11,760 ft. (Medetsiz). On the other hand there is an abundance of ranges in the east, rising to 18,095 ft., Büyük Agri (Great Ararat), and in the south-east, near Hâkkâri, the Cilo and Sat chains, with more than twenty glaciers and lakes, attain a height of 13,675 ft. (Gelyasin). These massifs enclose a large plateau, from which protrudes the volcanic cone of Erciyes (12,810 ft.) with its small glacier.

Towards the west the plain tails off into a confusion of foothills and valleys.

Almost the whole country is subject to earthquakes. In some of the basins there are lakes without outlet, such as Lake Van in the east, with an area of 2305 square miles, 5640 ft. above sea level; Tuz gölü (Salt Lake) with an area of 1010 square miles, 2945 ft. above sea level; Beyşehir with an area of 1030 square miles and an altitude of 3660 ft.; Egridir, area 325 square miles, height 3030 ft.; and many others.

The most important rivers are on the accompanying map, principally those which flow through mountainous territory. The lakes and most of the rivers are very suitable for canoeists, which unfortunately is not generally known.

The Mountain Chains

Innumerable high mountain chains unite in the Pamir, in High Asia, thence they tail off to the west in different directions, skirt the Persian Plateau and finally unite once more in East Anatolia, after which they divide again into two large ranges. The first is the Pontic Border Range and the second the Taurus Chain. The Pontic Mountains are split up into two parallel chains; the most northerly of which is the Rize Range, the highest point being Kaçkar (12,915 ft.), where some

glaciation dating from the ice age has been observed. This range gradually decreases in height towards the west.

The Cimen-Kop-Tortum Chain lies behind the above and to the south is the Erzerum Plateau (5900-6250 ft.). South of Erzerum is Palandöken (10,245 ft.), well known as a skiers' mountain. Still further to the south lie the Monzur Mountains (Mountains of a Thousand Lakes).

There are many savage peaks surrounding Lake Van. The highest points in Asia Minor are Agridag (Ararat), rising in the north-east to a height of 18,085 ft., and Little Ararat (12,875 ft.). Situated at the edge of Lake Van, Süphandag attains a height of 14,545 ft., and Nemrutdag, celebrated for its crater lakes, 10,005 ft. South of Lake Van are to be found some very fissured young mountain chains bearing away to the south-east. Their highest summits are Gelysin (15,680 ft.) in the Cilo Group, and Çia Hendevade (10,430 ft.) in the Sat Group. These East Anatolian ranges spread out fanwise to the west.

They enclose the Anatolian Plateau from the north and south; some of the ranges penetrate into the plateau itself. The best known of the chains is the Taurus Group lying to the south; it is much more interesting than the northern ranges.

The East Taurus Chain extends right down to the Bay of Iskenderun. The Middle Taurus constitutes a high wall across the Adana Plain and extends to the Bay of Antalya; it then turns away to the north and encloses the Anatolian plateau from the west. It is called Sulten-daglari. Further to the north it continues, with some interruptions, as far as the well known skiing mountain of Uludag (7710 ft.), the historic Mount Olympus of Asia Minor, near Bursa, south of the Sea of Marmora.

North of the Bay of Antalya, the ranges draw near each other at the great lakes of Egridir and Beyşehir. The Beydaglari, with several summits of about 10,000 ft., here form the Western Taurus.

The Middle Taurus is situated between Uzun yayla (Long Summer Grazing Grounds), to the south of Sivas, and the West Taurus. Near Aladag there are several mountains suitable for climbing, such as Demir kazik (Iron Post), rising to a height of 12,250 ft., and Medetsiz (11,695 ft.) in the Bolkar Range. These are the highest peaks in the Middle Taurus.

There are some volcanic cones in Central Anatolia at the edge of the plateau, all well known peaks, such as Erciyas (12,845 ft.) near Kayseri, and Hasandag (10,685 ft.) near Nigde, south-east of Tuz gölü (Great Salt Lake). There are some wooded hills in West Anatolia; for example, Bozdag (7075 ft.).

Historical Survey and Present Day Position of Mountaineering in Turkey

From the historical standpoint Anatolia is an old civilisation and is regarded by many scholars as the cradle of mankind. Many nations have fought there for their very existence and there was much exchange of population (emigration, etc.). All this fighting and tribal movement took place over high mountain ranges, as they were obliged to negotiate high passes and trackless mountains.

These movements of population may be regarded as the first historical essays in mountaineering.

Hunting also played its part in encouraging mountain travel, as it did in the Alps, and to-day it is one of the favourite pastimes of the Turkish peasants and shepherds. It is carried on not only in the plains but also in high and wild mountain regions, both in summer and winter. In order to pursue their game the hardy peasants climbed the steep ridges and rock towers of the precipitous mountains and can therefore be justifiably regarded as the first Turkish climbers.

But real mountaineering did not exist in Turkey until very recently. It developed slowly but methodically, hand in hand with the younger sport of ski running.

Although one generally considers that the first World War gave the spur to the sporting development of mountaineering—a ski troop was formed at that time—serious and systematic climbing did not start until 1924.

The social composition of the Turkish nation, 75% of which consists of peasants and small town dwellers, does not produce the conditions necessary for popularising the sport, as is the case in most countries.

Fortunately, life in Turkey is little affected by the disturbing influence of industrial development, so that the urgent need to find an outlet in sport barely arises. But the Turkish leaders fully realise that the future of their country depends upon the turning out of the right type of man, who will have need of physical training.

Up to 1935 there had been a Union of Turkish Physical Culture Clubs, but following a congress in Ankara, this union was reorganised and called "Türk spor kurumu". In 1938 the Sport Law was promulgated and in place of the former honorary leadership, the development of sport became a prerogative of the State and was directed by government officials. The ruling body was entitled General Management of Physical Culture and directs all sporting activities, apart from that carried on in schools, at the present time. At first the organisation was looked after by the President's Office, but is now controlled by the Ministry of Education.

All the different sporting organisations work together, including the Turkish Mountain and Ski Club, of which the author was Honorary President from 1940 to 1943. The club works to the following programme as far as mountaineering is concerned:

- a) Study of the well known massifs; publication of maps and guide books.
- b) Holding of mountaineering courses and publication of technical books on climbing. (One of these books, based on the well known "Technique of Climbing" by the Uto Section of the Swiss Alpine Club, will shortly appear.)
- c) Construction of huts and mountain inns in different localities.
- d) Formation of clubs for climbing and ski-ing in suitable regions.

Up to the present time, owing to the scarcity of means and workers, only the following mountain regions have been the subject of close study: Erciyes (12,845 ft.) near Kayseri; Medetsiz (11,760 ft.) in the Central Taurus; the Cilo Range near Hakkari in south-east Turkey; Kackar (12,915 ft.) in the north-east mountains; and Agri (Ararat) (18,095 ft.).

During the next few years, Agri, Kackar and the Sat Range will be once more the subject of careful examination.

Up to the present time fourteen mountain and ski clubs have been founded and twelve huts and mountain inns built.

Owing to shortage of labour and financial means this programme will not often be repeated.

Well-known Climbing Areas and Climbs Described in Guide Books

1. Hüseyin Gazi (5500 ft.), about 7 miles to the south-east of Ankara, the capital, is the training ground for Ankara's young climbers. Its sound rock permits every form of climbing technique on a small scale.

2. Erciyes (12,845 ft.), near Kayseri, is the historic "Mons Argerus" of the Romans. A well-built mountain inn is situated on the col (7055 ft.) to the east of the mountain.

It takes four hours walking from this inn to the foot of the east face. Thence a snow couloir is reached at 10,660 ft., by means of which an easy snow slope, somewhat subject to falling stones, is attained, leading to the east summit in four hours. A rock tower 65 ft. high forms the final obstacle to the west summit, which is reached by a traverse of the west arête. The tower has good solid holds on the north side, the climbing is very exposed and moderately difficult. There are summit books on both peaks.

A most interesting climb can be made up the north-west side, over the Erciyes Glacier and a very steep snow slope, the lower part of which is exposed to falling stones. This route was followed for the third time in 1942 by Herr Pfister, an architect from Berne.

The steep north face is still unclimbed. In 1942, Herr Pfister made a solo ascent of the east summit via the interesting and very exposed north-east ridge.

Several articles have been written about this mountain, as follows: Strabos, *Description of the Earth*, translated by A. Forbiger, volume 3, 2nd edition, Berlin 1858; J.W. Hamilton, *Journey in Asia Minor*, Leipzig 1843; P. Tchichatscheff, *Asia Minor*, Paris 1853-1869; A. Penther, *A Journey Round Erciyes Dag*, Geogr. Soc., Vienna, volume 6, 1905.¹

The first thorough study by Penther includes a map of 1:80,000. In 1930, Dr. Gerhard Bratsch explored the whole terrain and published an article of 200 pages on Erciyes.

An article entitled "Erdschias Dag, 3916 m." by Moritz Blumenthal, which appeared in *Die Alpen* in 1938, pp. 82-87, with an orographic sketch, is also worth reading.

The publications of the Universities of Istanbul and Ankara are also of interest.

Erciyes with its very extensive snow slopes has now become very popular with skiers.

3. *Taurus Range*. This range (West, Central and Anti-Taurus) has scarcely been explored from a mountaineering standpoint. Only the highest point, Bedetsiz (11,765 ft.), has been climbed and a summit book deposited on the top.

The Taurus Range boasts of several very long and steep faces which are still unclimbed.¹

4. *Cilo and Sat Group*. The provincial capital Hakkari lies in south-east Anatolia to the south of Van on Lake Van. This is the starting point of the most interesting mountaineering expedition in Asia Minor. Like a National Park, this area has deeply cut valleys, vertical faces, more than twenty examples of glacierisation dating from the ice age, lakes, many bears, wolves, ibex, moufflons, foxes, etc. There are even some panthers. The area has only been explored five times in all. It was inhabited by the Mussasir in 750 B.C. and relics of their civilisation are still to be found in the plains and lonely valleys.

There are about fifteen summits of over 3500 m. (11,480 ft.) in the Cilo district, and many fine spires, points and towers, faces and ridges have yet to be climbed.

There are also numerous lakes and evidence of glacierisation in the Sat Massif, together with eight peaks of over 3500 m.

The best description of this region is by Dr. Hans Bobek and his party, published in *Petermanns Mitteilungen*, May 1938, No. 5. Attention is also drawn to an article in *Die Alpen* 1939, No. 7, by Herbert Kuntscher, a member of the Bobek expedition, on the Hakkari mountains.¹

5. *Kackar dagi* (12,910 ft.). The Kackar massif, situated south of Pazar on the Black Sea coast, between 41° and 41° 30' eastern longitude, is the highest section

¹ See Editorial P.S. at end of article.

of the so-called East Pontic Chain. It consists of a number of jagged peaks, such as Kackar or Kavrandag itself, Bulutdag (11,515 ft.), Kemerdag (11,810 ft.) and Altiparmak or Six Finger Peak (11,480 ft.), all of which are above the snow level and form a continuous wall stretching away to the north-east.

The terrain has been systematically explored by Dr. Sirri Erinc of the University of Istanbul. He published his results in the *Revue de la Faculté des sciences de l'Université d'Istanbul*, series B, volume 15, Nr. 3, under the title "Glacérisation in the Kackar Massif in the Ice Age and at the Present Time".

6. *Aggıdag or Ararat* (18,095 ft.). Turkey's highest mountain lies on the Persian frontier in East Anatolia. As this territory is in a military zone, the mountain has latterly only been climbed by military personnel. According to reliable reports the peak is best climbed from Iğdir in the month of August. Iğdir (2870 ft.) is situated to the north of Dogubeyazit (6565 ft.) and is the terminal point of the road from Erzerum to Iran.

The way lies past the "spring" (Bulak) through moss-covered scree and scrub to the lower summit of Mihtepe (14,435 ft.) where one bivouacs in the snow. The section from Mihtepe to the top of Agri is about 3000 ft. long and is completely covered with ice and snow. Above 4800 m. (15,745 ft.) the frozen waterfalls and hanging icicles impart a fantastic appearance to the landscape.

Sulphurous ground is encountered at 5000 m. (16,400 ft.). Far below, the frontier river of Aras is seen as a silver ribbon. The summit consists of a snow field 1300 ft. wide, the level of which is only interrupted by a small eminence. To the south-east is Little Agri (12,875 ft.).¹

Conclusions

The foregoing short description of Turkish mountaineering makes it evident that Turkey is still largely unexplored from an alpine standpoint and that it offers many possibilities, even of first ascents, to climbers thirsting for new worlds to conquer. Turkish mountaineering is only in its first stages and climbers are largely dependant upon their friends from Central Europe, especially from Switzerland. Swiss climbers have repeatedly played a leading part in the mountaineering development of Turkey, which can be deduced by reference to many Swiss publications. In this connection a project for a joint Turko-Swiss expedition to the Hakkari Area in the south-east of the country, has recently been proposed. This district is very little known and is without doubt worth exploring.

As regards shelter, food supplies and transport communications, the mountains of eastern Turkey, although they cannot be compared to the Himalayas, are nevertheless as unexplored as many mountainous regions in the interior of Asia.

¹ See Editorial F.S. at end of article

The lines of approach are long and exceedingly toilsome; shelter is very rare and extremely primitive. Temperature variations alternate considerably between night and day and there is great scarcity of water in many places. The local population is poor but on the whole well-disposed and ready to help; food is limited to sheep and occasionally a little bread. Strong physical and moral resistance are demanded of climbers by the climate and configuration of the ground, and considerable regard must be had to primeval and deeply rooted habits and customs. As a general rule the weather is fine and settled from July to September.

The leading Turkish climbers would enthusiastically take part in any such expedition, and are well worthy of the co-operation of foreign mountaineers. On the other hand, foreign climbers penetrating the isolated east Anatolian mountains, would discover a region which is still largely terra incognita to the Turks as well as to the outside world. The great successes which Swiss climbers have achieved in recent years all over the world make it quite understandable that their Turkish friends should think of Switzerland when considering plans for an expedition. Perhaps it would be possible for the Swiss Foundation for Alpine Research to organise an expedition to Turkey.

Meaning of Turkish Mountaineering Terms and Method of Pronunciation

C = dj; Ç = tsch; S = Sch; g = soft g; ı = dull i (no dot), spoken with the palate.

Ak = white; Ağaç = tree; Buzul = glacier; Çay = stream; Çayır = meadow; Dag = mountain; Dağlar = mountains; Dag evi = mountain inn; Doruk = summit; Dag silsilesi = mountain chains; Dag sirti = mountain ridges; Dere = stream; Göl = lake; Irmak = river; Kasaba = provincial town; Köy = village; Kaya = rocks; Kaynak = spring; Keçi yolu = goat track or path; Nehir = river; Ova = plain; Orman = wood; Sivri = point; Signak = hut; Şehir = town; Sose = main road; Tepe = hill; Taş = stone; Vilayet = province; Vadi = valley; Yayla = summer grazing grounds.

Editorial P.S.

1. *Argæus, Argaios, Argilus, Argerus...* Erciyes Dağı, Erdjar or Erdschias Dag, Erciyes Dag... all these names have been subject to constant change since time immemorial (see *Berge der Welt I*, p. 29). There is a considerable bibliography on the subject.

The titles of the various articles are as follows: Arnold Penther, "A Journey Round Erdschias Dag in Asia Minor, 1902". (*Proc. Geogr. Soc. Vienna*, vol. 6, No. 1, 1905, p. 48.) Gerhard Bartsch, "Erciyes Dag and the Town of Kayseri in Central Anatolia". (*Year Book of Geogr. Soc. Hannover*, 1931, p. 87-202.)

The following should be referred to: Eugen Ritter, "Erdjias Dag, the 'Mons Argæus' of the Ancients above the Anatolian Steppes". (*Jl. of German-Austrian A.C.*, vol. 62, 1931, p. 124-149.)

Kurt Krause, "Vegetation on Argaeus and Erciyoz Dag in Asia Minor". (*Naturwissenschaften* 1932, p. 243-244.) Ludwig Krenneck, "On Erdstias Dag". (*Allgemeine Bergsteiger-Zeitung*, 1932, No. 482), "In Conflict with the Mountain, Stirring Mountain Adventures". Zürich, Orell Füssli, 1934 (Erdstias Dag). René Challanda, "To Mount Erdias" (*La Montagne*, 1939, p. 261-264).

2. Taurus: Georg Künne, "The German Taurus Expedition 1927", "Ala Dag in Cilicia", "Scientific Conclusions". (*Petermanns Mitteilungen*, 1928, p. 273-276.) Georg Künne and Wilhelm Martin, "The German Taurus Expedition 1927". (*Österr. Alpen-Zeitung*, 1928, p. 28-41 and 49-51.) Kurt Reischneider, "Report on the Taurus Expedition 1934". (*Österr. Touristen-Zeitung*, 1934, p. 142-144.) "The German Taurus Expedition 1938". (*German-Austrian A.C.Jl.*, 1939.)

About Ala Dag: Georg Künne, "Ala Dag". (*Year Book of Austr. Touring Club*, 1930, p. 155-167.) Georg Künne, "Ala Dag". (*German-Austrian A.C.Jl.*, vol. 61, 1934, p. 194-205.) Georg Künne and Wilhelm Martin, "Ala Dag in S.E. Asia Minor". (*Die Alpen*, 1928, p. 401-423, with orographical sketches.) R.A. Hodgkin, "The Ala Dag". (*Alpine Jl.*, May 1944, p. 235-245. With an orographical sketch and much detail.) E.H. Peck, "A Further Expedition to the Ala Dag 1944". (*Alpine Jl.*, May 1945, p. 45-55.) L.H. Hurst, "Note on Ala Dag 1945". (*Alpine Jl.*, November 1945, p. 222-223.) Moritz Blumenthal, "On Turkish Mountains". (*Die Alpen*, 1930, p. 135-144, with special geological-orographical sketches.)

3. Cilo and Sat Marisr. Hans Bobek, "Exploration in Central Kurdistan Mountain between Lakes Van and Urmia". (*Petermanns Mitteilungen*, vol. 84, 1938, p. 152-162 and 215-228, with maps.) Herbert Kuntzsch, "Climbs in Central Kurdistan". (*Die Alpen*, 1939, p. 254-261.)

4. Ararat. The bibliography on Ararat is naturally very comprehensive; Dreyer and Bühler mention more than 25 articles. For a chronology of climbs prior to 1893, refer to *German-Austrian A.C.Jl.*, No. 515, 1893 (Rickmers).

CORDILLERA HUAYHUASH

Andes Expedition of the Austrian Alpine Club, 1954

By Heinrich Klier

All the time we were passing through the wild gorge of Pacllón, two unanswered questions were never far from our lips: when will we see "our" mountains and what will they look like? We had seen them in the far distance three days earlier from Punta Mojón (4295 m., 14,090 ft.) and from Chiquián, the principal town of the Peruvian province of Bolognesi, looking for all the world like a herd of white horses, now visible, now disappearing and always dominated by the majestic Yerupajá.

Since then we had been riding through brown, scorched, rocky gorges overgrown with tropical vegetation. Cacti and huge blue-green agaves shot up flame-like all along the track and from the saddle we were able to see the black trout playing in the stream.

On leaving Chiquián (about 3300 m., 10,825 ft.) we had to ride down the valley of Pativilca for half a day as we could not gain direct access to it from the sea. We left the main valley at the point where the gorge of Pacllón comes in from the east and began to climb once more.

At this juncture the first party elected to travel via Pacllón and the second party via Llaca. However, climbers, porters and arrieros had trouble with the mules and donkeys on both routes. The track through the gorge of Pacllón was washed away when the glacier lake of Solterahanca burst in 1932 and had not been repaired, so that we rode partly in the bed of the stream itself and partly along a track about a foot wide, high above the abyss.

The route via Llaca was in better state but from the village it lead without a break up interminable zig-zags to the top of the Culebra Ridge 1000 m. (3280 ft.) high, thence dropping down to the pampas of Incahuian.

At the further end of the Pacllón Gorge we came within the area of the photogrammetric map of 1:50,000 of Prof. Hans Kinzl and at last felt that we were in the picture. Our whole expedition had been based on this map, which, according to Prof. Arnold Heim, is the best of its kind in South America and really constituted a scientific and touristic accomplishment of the first order. It was made in 1936 by Erwin Schneider (dipl. eng.) and Arnold Awerzger in collaboration.

Suddenly, as we were riding over the greenish-brown meadows, we perceived a white peak towering into the heavens, unbelievably high and shapely; Jirishhanca—the "Hummingbird's Beak of Ice" is the best translation. We reined in and stared at the enchanting sight for a long time. Right down the valley Jahuakocha, the large glacier lake, nearly 2 km. (1¼ miles) long, gleamed in the sunlight, while the snow peaks behind it reached up towards the sky. The whole of the north part of the mountain group was visible; Nevado Rondoy, a terrifying rock and ice pyramid; Nevado Jirishhanca, queen of the snows; Nevado Yerupajá Chico with its three summits; Nevado Yerupajá Grande, which is considered by Heim to be the most beautiful and striking mountain in South America. To the west of the main chain was Nevado Rasac, the lowest of the 6000-m. peaks. This stupendous panorama was in itself worth the trip to the South American continent. But we were not so dazzled by the majesty of the scene that we did not take in the apparent inaccessibility of the massif, particularly from our side and under the conditions then prevailing. (Experts had told us as soon as we arrived in the country that the rainy season had lasted some weeks longer than usual this year; the fatal accident to our friend Fritz Kasperek and his companion Toni Matzenauer on Salcantay was, moreover, a bad omen.)

We were well acquainted with these mountains from photographs, but no picture could in any way vie with nature. Now we were actually face to face with reality—rock and blue ice. There they stood, ice-pyramids that glittered in the afternoon sun; never had we seen anything like the fluted ice slopes that were crowned by unbroken mile-long cornices.

"The Hummingbird's Bill" was topped by a really fantastic structure of névé and cornice on surrealistic lines, about 100 to 130 ft. high. Only a bird could have attained the summit that year.

At last we knew what the mountains looked like, but how were we to climb them? We could not tell from which side to attack them; Rondoy and Jirishhanca were certainly inaccessible from this side at all events, but perhaps it would be possible to climb Yerupajá Chico. Time would tell; after all, it was our job to find out, as we were essentially a reconnaissance party. At that moment an enormous ice-avalanche thundered down from half way up the Jirishhanca Glacier—a welcome and a portent.

So we rode on into the evening over the brownish-yellow pampas of Incahuain. The sparse pastures of the Indians at the very edge of the pampas were dotted with stone huts; there were corrals enclosing stocky cows and calves, and black pigs and poultry roamed about in a semi-wild state. Shepherdesses in their red cloaks (ponchos) and high straw hats lowered their gaze before the foreign intruders. Three condors glided without the tremor of a wing through the deep blue of the firmament. Wild ducks flew away at our approach, great wild geese

(Huachhua) took off from reedy marshes and even gulls and plovers were to be seen. We pitched camp in a green hollow among lilac-coloured lupins and bright yellow sipi bushes alongside the green shimmering lake of Jahuakocha. Our cook, Miguel, quickly constructed a hearth and did his best to set the bush on fire in honour of the winter solstice which is celebrated in these parts. We managed to restrain his ardour before much damage was done.

At about 6 o'clock the tropical night descended with great speed, quenching the glowing ice mountains and the violet-tinted foothills, so we gathered round the camp-fire with our Peruvian porters and arrieros to keep out the sharp cold of the clear mountain night. The thunder of ice-avalanches down the Jirishhanca Glacier at regular intervals disturbed our sleep, but we would soon get used to that as well as the rarefied atmosphere. We are already well launched on our great adventure.

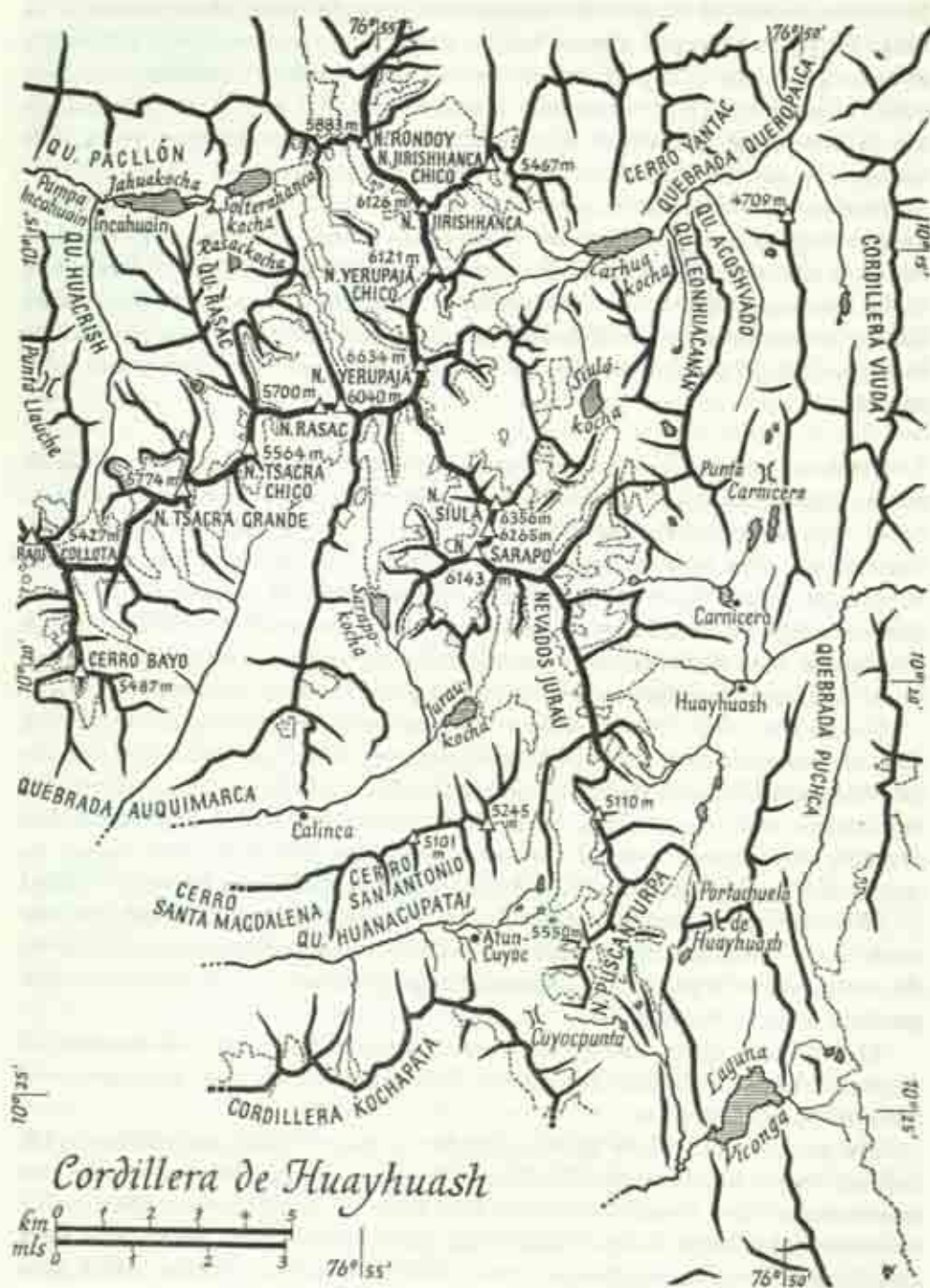
On the evening of June 24th the complete team of the Austrian Alpine Club's Andes Expedition 1934 was assembled for the first time at Base Camp at Jahua Lake. The leader of the expedition and also of the scientific group was Prof. Hans Kinzl, who may be regarded as the actual discoverer of the Cordillera Huayhuash. Prof. Kinzl continued the observations and measurements of the glaciers which he had begun in 1936 and was thus enabled to draw various conclusions as to the behaviour of tropical glaciers and the retreat of the glaciers in the Southern Hemisphere. His report on these subjects appears elsewhere.

His assistant was Heinz Löffler of Vienna, who was principally concerned with the biological and chemical investigation of glacier lakes including, for the first time, soundings taken from a rubber dinghy. This dinghy not only amazed the Indians and roused them from their normal phlegmatic indifference but probably also created a world altitude record for a mountain navy—4735 m. (15,530 ft.) on the horseshoe-shaped glacier lake of the Upper Huacrish Valley!

(Walter Hofman, another scientific collaborator under Prof. Kinzl, did not work in the Cordillera Huayhuash but in the Cordillera Blanca immediately to the north, where he prepared a large scale map of Huascaran and did considerable geodetic work in the area.)

The climbing group was led by Wastl Mariner of Innsbruck and consisted of Siegfried Aeberli, Manfred Bachmann, Waldemar Gruber, Karl Lugmayer and the author; all Austrians.

The porters were led by Emilio Angeles of Huaras with great efficiency; his brother Victor and Natividad Vedón of Poepa also considerably exceeded our expectations. The remaining porters also gave us good service, often under conditions of extreme danger. But it was quite another story with the arrieros and the pack animals consisting of horses, mules, donkeys and llamas, which gave



us our fill of troubles. A notable exception was one Luis Robles of Queropalca, and on the whole the mules were efficient, though they are unfortunately becoming more rare.

The Cordillera Huayhuash was practically unknown twenty years ago and completely ignored by climbers. The German Cordillera Blanca Expedition in 1932 was the first to turn an expert eye from afar on these southern mountains, accurately estimating their height and importance, whereas travellers had merely passed by without examining them.

In 1936 a small Alpine Club expedition set out under the leadership of Prof. Kinzl, including Erwin Schneider and Arnold Awerzger. This small party not only brought home an excellent map of the area but succeeded in bagging two important peaks; Schneider and Awerzger climbed Siulá (6356 m., 20,850 ft.), the second highest summit in the district, and Schneider made a successful solo ascent of Nevado Rasac (6040 m., 19,810 ft.). These two attempted to climb the Great Yerupajá and reached the shoulder on the south-west ridge but were forced to retreat owing to the illness of Awerzger.

Based on the experience of this expedition, a strong North American climbing party went to the Cordillera Huayhuash in 1950. After several weeks of efficient teamwork by all members, Dave Harrah and Jim Maxwell forced a way up the Great Yerupajá (6634 m., 21,785 ft.), a majestic peak in the very heart of the massif. They suffered, however, from severe frostbite and other injuries.

The 1954 Andes Expedition succeeded in climbing the unnamed peaks Point 5067 (16,620 ft.) and Point 4779 (15,675 ft.) in the chain to the north of Jahua Lake, which Heim calls Sierra Culebra. Point 5247 (17,310 ft.) above Lake Solterahanca and Points 4938 (16,200 ft.) and 5036 (16,520 ft.) on the divide between Quebrada Huacrish and Quebrada Rasac were also ascended. These reconnaissances proved beyond doubt that an attack on the two northerly summits, Rondoy and Jirishanca from the west was unthinkable under existing conditions.

However, several 5000-m. peaks of extreme beauty rise up from the Tsacra Chain stretching westwards from Rasac, all unclimbed and very precipitous. The most lofty of these is the Nevado Tsacra Grande, 5774 m. (18,940 ft.), a mighty rock and ice structure rising above the eastern branch of the upper Huacrish Valley. At the eastern end of the massif the Nevado Tsacra Chico (north summit 5513 m. (18,085 ft.) and main summit 5564 m. (18,250 ft.)) soar together with about half a dozen unnamed peaks between 5200 and 5600 m. (17,055 and 18,370 ft.). At the opposite end is the beautiful Raju Collata, 5427 m. (17,800 ft.), above the Llauche Pass. Here there is indeed everything for the mountaineer.

Our first reconnaissance from Base Camp led us into the innermost recesses of the Huacrish Valley. We put up a small camp at 4753 m. (15,590 ft.) for the

six climbers and two porters at the foot of the huge moraine wall which acts as a dam to the horse-shoe-shaped glacier lake. We left this spot very early on the morning of June 28th for the Tsacra mountains. We climbed slowly up the seemingly endless moraine wall, illuminated by the ghostly light of a pocket torch and by dawn we had attained a height of some 5000 m. (16,400 ft.). Here Bachmann and Lugmayer left the other four and went off over the badly crevassed lower Tsacra Glacier to reach the foot of the Tsacra Chico north peak. A direct ascent to the main summit looked impossible and even the traverse of the heavily corniced ridge between the two peaks, liberally garnished with savage gendarmes, appeared very doubtful.

At the edge of the upper névé basin of the Tsacra Glacier the rest of us took our sacks from the porters, whom we sent back to camp. We ascended direct to a little corniced col on the south-east side of the summit which we had first observed during our preliminary reconnaissance up a steep ice slope where we had our first experience with the tropical "nieves penitentes". This was followed by steep but dry rock which enabled us to make rapid progress. The sun for which we had been longing was now beginning to become troublesome, so that we were not sorry when the steep rock petered out in a névé gully. The hard surface, however, soon gave way to bottomless powder-snow which let one in up to the neck. We fought our way up this horrible slope without any means of belay until it gave out into vertical iced slabs. Our main object was to get into the sun once again, but an attempt to traverse off to the ridge to the right failed owing to the icy slabs. All that was left to us was the direct ascent, so we struggled on with heavy sacks and frozen fingers over icy slabs of Grade 5 severity. This would have been more than enough in the Alps, but here we had to reckon with the rarefied atmosphere of 18,000 ft. as well, and the leader who had to cut steps in addition was extended to the utmost. On descending this pitch we roped down, but there was considerable difficulty in getting pitons to stay in the unreliable rock.

Above these slabs rose an ice slope and the intense heat of the tropical sun, combined with the instability of the snow covering, made us work hard for every run-out. At last about midday we reached the summit ridge but, owing to the cornices that were often 100 ft. high, we were not able to stand on the highest point. In the meantime the sun had softened up the 300 ft. snow slope above the slabs to such an extent that it looked as though we would have to delay the descent owing to danger from avalanches.

Meanwhile our two companions had appeared and were clinging like flies to the needle-sharp ice-cap of the main summit of Tsacra Chico.

We had been so busy with our own problems that we had not seen their traverse of the corniced arête, but as we slowly and carefully descended from our peak we were able to watch our comrades on the other side of the savage glacier

basin making their own way down by means of long traverses, re-ascents, jumping over bergschrunds and various roping-down manoeuvres.

At last, when we had finally reached the open glacier, they were still crawling along the upper lip of an enormous schrund, seeking for a way over. It looked as though they were going to be benighted and it was only to be hoped that they would not be driven to any desperate measures. We were in a quandary as to what was the best thing to do, for our shouts remained unanswered. However, before night came on we were all together at last, tired out but in good shape in our camp at Huacrish.

After the successful first ascents of the two great 5000-m. (16,400 ft.) peaks of the Tsacra Chain the whole party assembled in Base Camp at Jahua Lake, 13,500 ft., on June 28th. After a rest we started off again on the 30th, with all the porters and pack animals, to set up the first high camp for the ascent of Yerupajá. After some delay in starting—we were getting used to this by now—we made good progress. We branched off from the main valley and made a steep ascent up the Rasac Valley to Lake Rasac. The path ended at this point, but our porters wished to get as high as they could with the animals. What the mules carry is nobody's business. But the unexpected sometimes happens; they climbed like chamois with their heavy baskets hovering like birds over the abyss, when suddenly the leading mule, which was standing just below a rock wall, broke a step and the heavy load dragged it down backwards. I was only a few feet away but could do nothing. The animal crashed down the first steep slabs in three great bounds, the baskets hitting the rocks each time, and I rapidly calculated how many thousand Soles the animal would cost us, for there was no hold on the steep slope. Just then the saddle girth broke and the two baskets continued on their own, spilling food tins in a glittering stream down the hill side in the general direction of the stream at the bottom. No sooner was the mule free from its load than it spread out its legs like a spider, rolled over into a little gulley, jumped down the last pitch on all fours, shook its head and began to graze as though nothing had occurred to disturb its equanimity!

The tension broke and the porters, who were feeling a little guilty, rapidly collected the contents of the baskets which were strewn all over slope—all except our cooking apparatus, which was smashed to atoms. All the mules were off-loaded at once, but what were we going to do now? The porters, however, solved the problem by each taking a basket (half a mule load) and panting up with them to our camp-site at 13,750 ft. That night, when the blood-red sun sank into the cloud band on the horizon, three climbers' and two porters' tents stood together in a rocky dip close to a small pool and all the loads were there ready for transportation to the higher camps.

Rain and snow which lasted for three days drove nearly everybody back to Base Camp; only Manfred and Waldemar stuck it out in Camp II. On a radiant Sunday we all ascended once more to this camp. Our way now led up over a scree slope, followed by a steep snow-field to a shoulder below Point 5247 m. (17,310 ft.). The panting porters once more carried up the loads. On the other side of the savage crevassed glacier the untouched and seemingly untouchable giants, Nevado Rondoy, Jirishanca and Little Yerupajá, seemed almost within our grasp. Every now and then a roar like thunder was heard as the glacier threw down ice-avalanches over a 300-ft. rock step to the lower ice-field, which calved bergs into the green glacier lake at regular intervals.

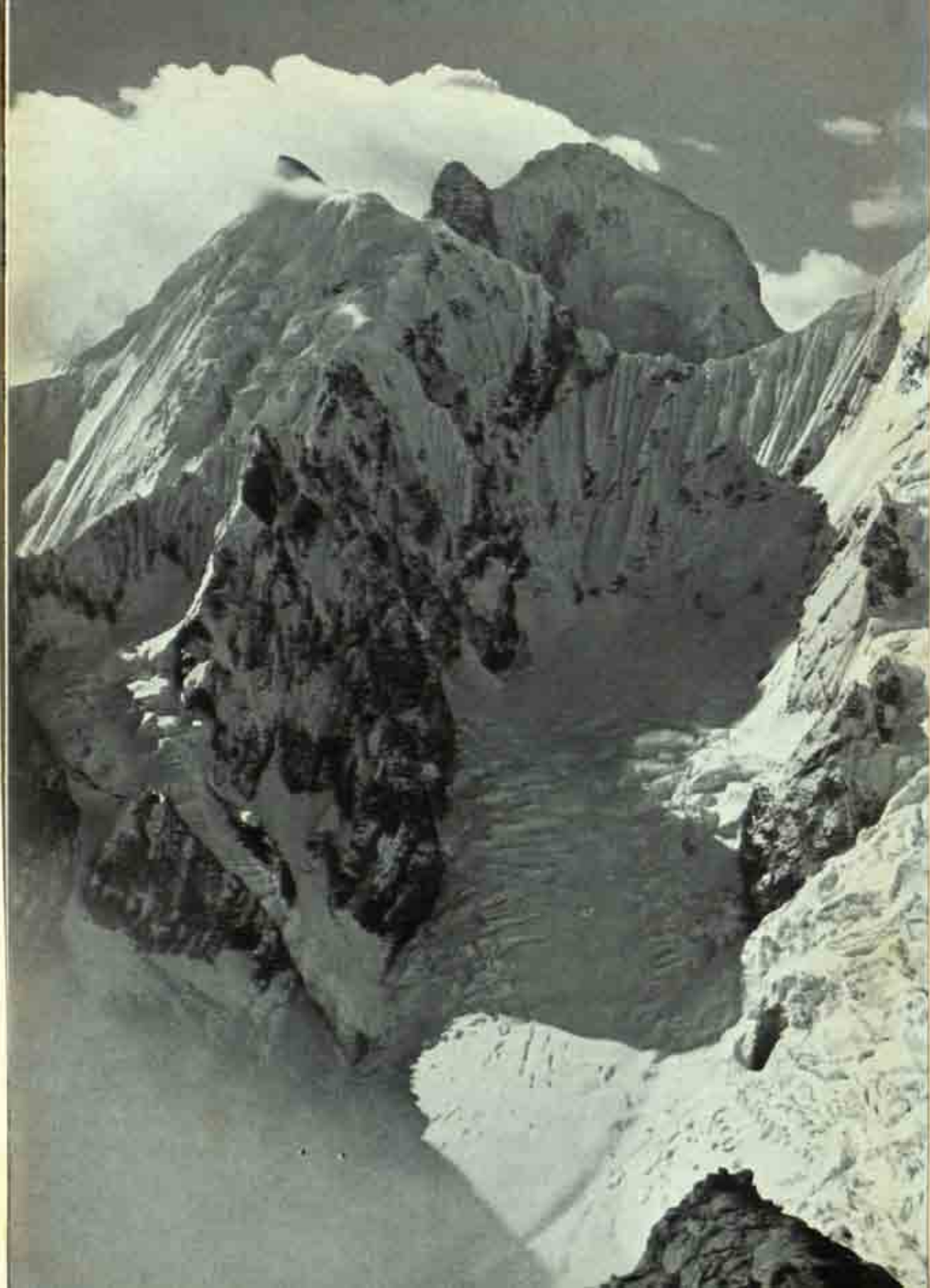
We traversed along small ledges to the lateral moraine and pitched camp a few feet below the abandoned camp-site of the American expedition. This we called Camp III.

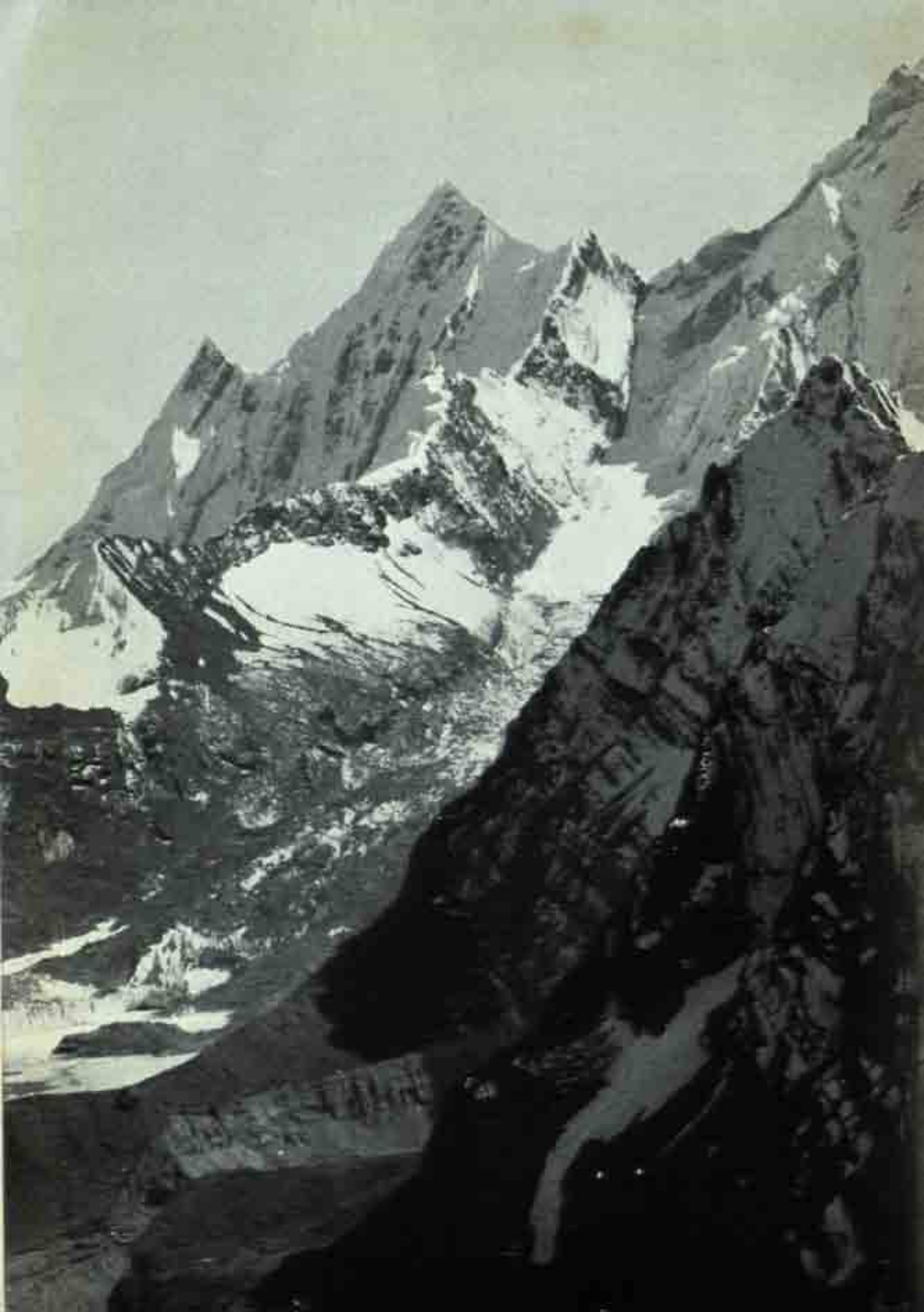
The next day, without further difficulty, we reached the site for Camp IV, in a trough at the far end of the basin of the Yerupajá Glacier between the steep ice slopes of Yerupajá and Nevado Rasac. The sun blazed down into the trough like a furnace. We sent the porters back and erected our small brown tents in the snow; it looked like a little village tucked away in this lonely spot where man had penetrated only twice previously. In the space between the tents, which we nicknamed The Square, we set up our cooking stove and food store. We could hardly wait for the sun to go down, it was so overpoweringly stifling, but no sooner had the last rays ceased to fall upon us than an icy cold took their place and forced us to put on our quilted coats and stand with icy fingers, stamping our feet round the petrol cooker. At the onset of night we crept thankfully into our low tents.

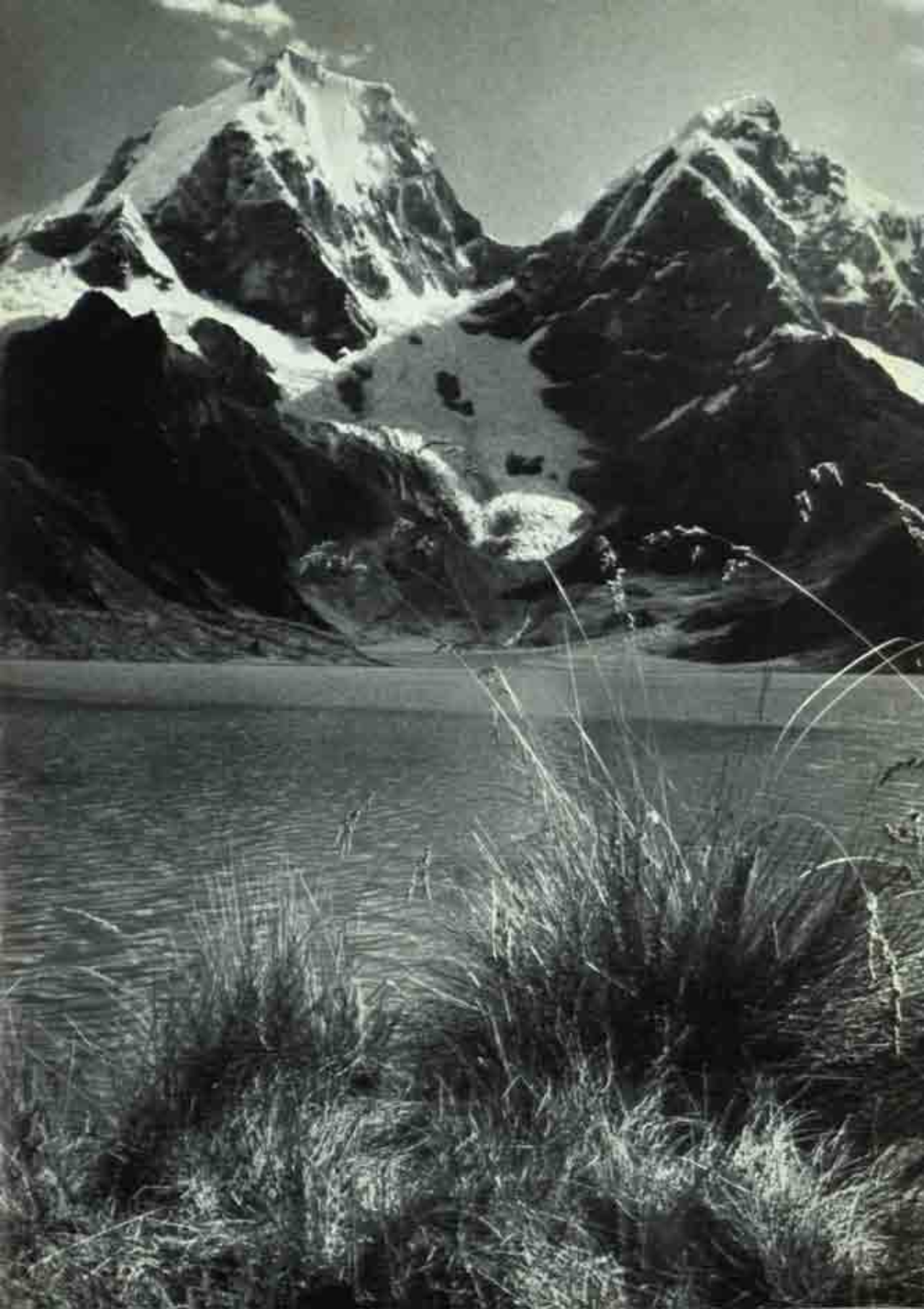
The night was long and cold. When one bivouacs in the Alps at home it is generally a matter of some 5 or 6 hours at the most, say from 10 p.m. to 3 a.m., but here in the Tropics the night lasts from 6 p.m. to 6 a.m. and is considerably colder. Breathing was difficult, wrapped up as we were like mummies in all our spare clothing within the narrow confines of our tiny tents. We were at an

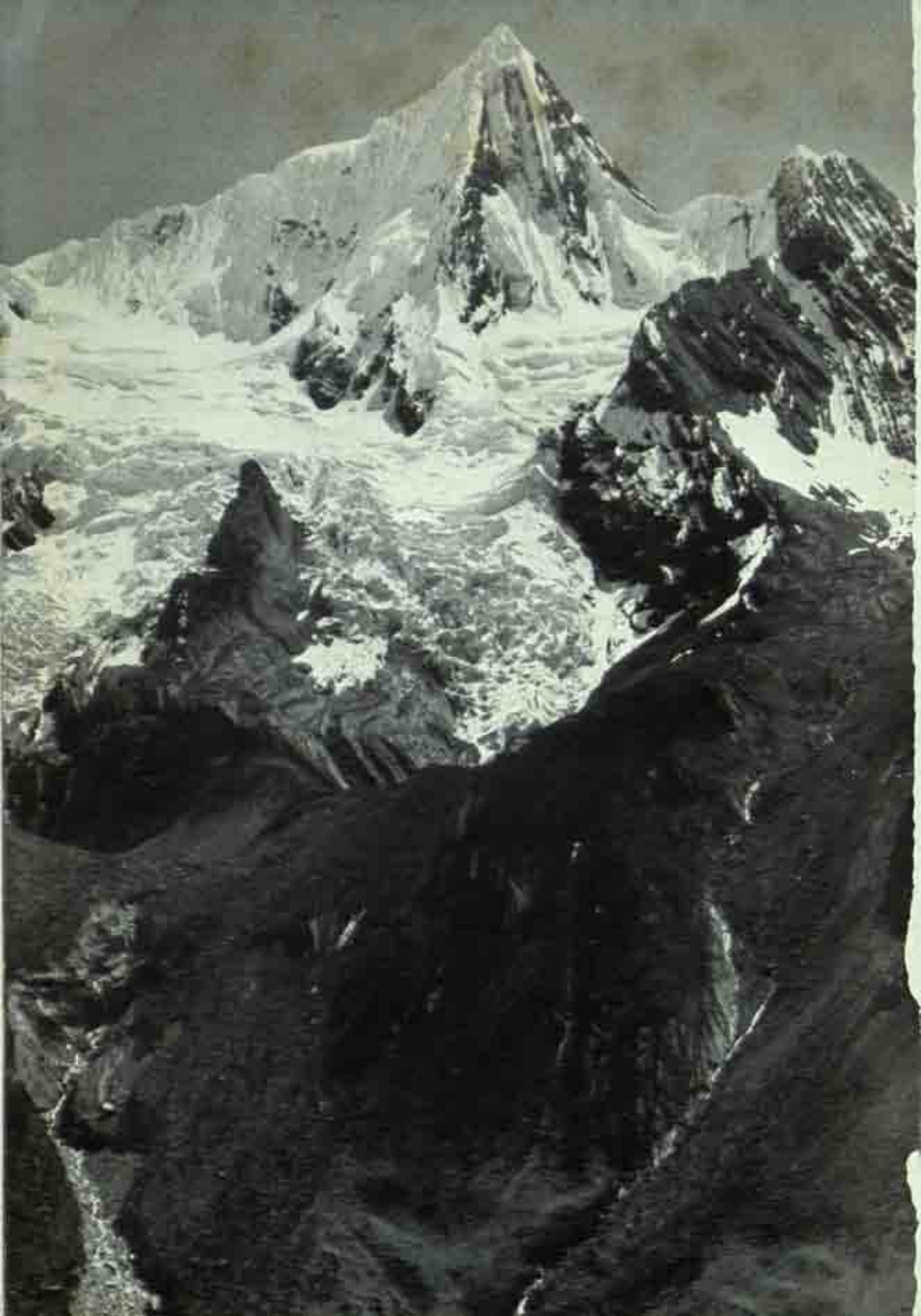
Plate 53: Sarapo and Siulá from the south. To the left Nevado Sarapo (6143 m., 20,150 ft.), the highest point reached by the expedition. In the background of the centre of the picture is the Nevado Siulá (6336 m., 20,810 ft.) climbed by E. Schneider and A. Auerzger in 1936. The striking black tooth between Sarapo and Siulá is known as Little Siulá (6265 m., 20,554 ft.), as yet unclimbed. Sarapo was climbed by Bachmann and Lugmayer in 1954 from right to left along the south-east arête and the face rising behind it.

Plate 54: Nevado Rasac (6040 m., 19,810 ft.) from the south. This peak was climbed by E. Schneider in 1936 and again in 1954 by Klier and Lugmayer from right to left up the east ridge which, owing to cornices, was abandoned for the face rising behind it. Little Rasac (5700 m., 18,695 ft.), the prominent tower on the west ridge, is still virgin. In the foreground is the moraine-covered West Sarapo Glacier which terminates in the Sarapokocha (lake) (4505 m., 14,775 ft.).









altitude of 18,400 ft. and we felt the lack of oxygen. When from time to time somebody flashed a torch in order to see the time, the whole tent lit up like the reflection of an old fashioned chandelier, for the tent walls were thickly coated with ice-crystals. The cold made itself felt when breathing or in any sort of movement; even so it was warmer than outside, where the night wind lightly caressed the surface of the glacier. Nevertheless, we were determined to stay here and put up with these conditions until we had bagged a 6000-m. (19,680 ft.) peak.

Dawn came at 6 a.m. The cold silver rays of the rising sun lit up the surrounding peaks, but our little community remained for some time yet in the shadow of the huge Yerupajá. We cooked breakfast, melted some snow, but all in a very lethargic manner, for the frost was still in our bones, and our fingers and toes were numb. The day was quickly planned; four men were to reconnoitre Yerupajá, while Wastl and I resolved to make an attempt on Rasac. The cold was still intense as we crossed the glacier and the huge bergschrund, followed by the traverse of a very loose rock face. Just as we put on our crampons the sun reached us and in a flash everything changed. Limbs thawed out, snow-glasses were donned and glacier-cream applied; soon we were climbing in shirt sleeves, perspiring freely! All in the space of a few minutes a temperature change had taken place equivalent to the difference between New Year's Eve and midsummer day at home, and we now fully understood why sun and fire stand so high in the religion of the Sierras, indeed next to the Deity Himself.

We cut step after step in the unreliable ice on the corniced ridge until midday. Now and then we were able to look over the edge and saw that our staircase was more or less suspended in space. Everywhere the state of the ice and snow was very bad, the cornices overhung many feet and the mountain, which according to the photographs we had seen should have been of bare rock, was plastered with ice and snow.

The two parties further over on the huge 1000-m. (3280 ft.) west face of Yerupajá were boring their way upwards through deep powder-snow like moles. From this distance it appeared as though they were going head first through it and the tracks behind them looked like a tail. They paused awhile below a large ice-wall and then had to descend a little and try again further to the left. In the meantime we had realised that we should not reach our summit that day. Had there been another and easier way down we could have gone on without cutting

Plate 55: Nevado Yerupajá (6634 m., 21,785 ft.) and Yerupajá Chico (6121 m., 20,075 ft.) from the east. The Great Yerupajá is the highest point of the Cordillera Huayhuash, the second highest mountain in Peru, and was climbed by D. Harrab and J. Maxwell in 1959; the Little Yerupajá is still unclimbed. In the foreground is the large glacier lake Carhuakocha (4138 m., 13,575 ft.).

Plate 56: Nevado Jirishbanca Chico (5467 m., 17,930 ft.) from the south. This sharp summit on the great north-east arête of the Nevado Jirishbanca (6126 m., 20,095 ft.) was climbed by Aeberli and Mariner in 1954 from right to left up the steep rock and ice east arête.

steps, but we were fully aware that we should need every step for the return. The corniced ridge, moreover, was so dangerous that we would have preferred to make a detour on the steep face. The death of Fritz Kasperek, with whom I had travelled out from home, was still fresh in our memory, so the less we had to do with cornices the better. We turned back almost at the same time as our opposite numbers on the Yerupajá face. We were forced to realise that the standards of a normal season did not apply here and that we had a hard struggle before us if we wanted to get higher than 6000 m. (19,680 ft.).

As soon as the sun had disappeared the worst part of the day began. The tea froze in the cups even after a few minutes, as we sat huddled up in all our reserves of clothing, and our breath came out in great clouds. There was no pleasure in anything.

Next morning all three parties united in a further attempt on Rasac, 19,810 ft. This was more promising than Yerupajá, which under the prevailing conditions could only have been attacked by a slope much exposed to avalanches. At about 2 p.m. Karl and I were high up the east face of Rasac, which according to him could be compared to the Eiger North Face. Manfred called from below: "I suppose you haven't forgotten that you've got to get down again?" We stayed awhile on our tiny stance and considered the distance to the top, perhaps three rope lengths, and saw that on this extremely steep and icy face we would take an hour for every 40 m. (130 ft.) run-out. That meant that we could not get to the top before 5 p.m. At 6 p.m. night would fall and without bivouac equipment a night out would be unthinkable. Even with full equipment it would at best be a very risky undertaking, so with heavy hearts we had to beat a retreat. We got back to our camp just before darkness descended and all were of the same opinion that it was hopeless under the present conditions. Next morning we would strike camp.

When I had snuggled down in my sleeping bag I began to think. We had hoped and suffered, the porters had carried and worked hard, there was our staircase carved diligently up the face where we had spent hours hacking ice off the rocks right up to that little rocky knob three ropelengths below the top. Surely all this labour was not in vain? Surely we were not to leave this enchanted spot without a peak to our credit?

"Karl, what about having another crack at Rasac tomorrow morning, while we're still in the mood?"

So next morning Karl and I roped up after a very unsatisfactory attempt at breakfast. The cold was even worse to-day, so that we felt like crying. On and on we went and at last reached the rocks. Far below the porters could be seen crossing the glacier to help us strike camp. Once again the corniced ridge and the sun with its warming rays; half an hour later we were bathed in sweat and

breathing with difficulty. Just as we reached the place where we had turned back the previous day we could see the last of the party leaving the camp site and going down.

Ahead of us soared a very steep ice-arête. For an hour or more Karl was poised above me, hacking away while splinters of ice showered down on me, until at last I could follow. Standing on a tottering boulder which he called a belay, I took over the lead and climbed up over unstable ice to a small rock needle where I found a stance. We began to feel a breeze and it was quite evident that the summit could not be very far off. Karl now took over and cut steps up a glittering ice-edge. I paid out another 100 ft. of rope and then heard a shout of victory from above. I followed and found Karl belaying me over his axe that was rammed hard into an enormous cornice. A few steps more to the north, along the almost horizontal top of the cornice, and we had reached the highest point, the summit of Nevado Rasac, our first peak over 6000 m.

The days by the lovely lake of Jahua sped by all too quickly. On July 11th the whole party went off to the south over the Punta Llauche (15,900 ft.) and the still higher Tapush Pass. At the junction of the valleys of Tapush and Calinca the isolated village of Huayllapa lies away up on the right-hand side and on the opposite side is the fine Hacienda Auquimarca belonging to Señor Especo, an old acquaintance of Prof. Kinzl. We got a warm welcome here. The next day the climbing party went off eastwards into the magnificent Quebrada Huanacupatai and pitched the second Base Camp at the end of the Cuyoc Valley at the foot of the steep rock tower of Nevado Puscanturpa.

During the next few days the party climbed the two highest peaks of the Cerros San Antonio, Point 5101 (16,730 ft.) and Point 5245 (17,205 ft.) (the highest point of the range) as well as Point 5320 (17,450 ft.) overlooking the Cuyoc Pass. Mariner and Aeberli made an attempt on the 5550 m. (18,205 ft.) south summit of Puscanturpa and reached the summit ridge via the south-east face, very steep and exposed to avalanches. As they set foot on the cornice-crowned arête they accidentally started off a wind slab avalanche which carried them down about 300 ft. Fortunately they were able to disengage themselves from the sliding mass and continued their way down unharmed.

Two days later, Aeberli and Gruber, Bachmann and Lugmayer, climbing on two ropes, made a direct ascent of the north peak of Puscanturpa up the east face, passing to the east of the steep rib running down to the Cuyoc Valley.

As time was pressing, Base Camp was evacuated immediately following this successful ascent. A small climbing party, travelling light, crossed the continental divide over the large and level glacier close to Point 5110 m. (16,760 ft.) and then descended to the hamlet of Huayhuash, which has given its name to the whole

chain. The main party, having commandeered every available llama owing to a shortage of pack animals, now went over the Punta Cuyoc (16,320 ft.) on a very bad track, past the large Laguna Viconga and then over the Portachuelo de Huayhuash. The whole party, now reunited, reached the site for Base Camp III, passing over the Punta Carnicero (15,020 ft.). This was delightfully situated on the shore of Lake Carhua, in whose grey-blue waters were mirrored Yerupajá and Jirishhanca.

A combined effort by all the climbers and porters enabled a succession of camps to be carried forward up the savage and dangerous Sarapo Glacier. Maintenance of communications between these camps on the unusually rapid-flowing glacier was rendered both difficult and dangerous by reason of falling séracs, ice-avalanches from lateral hanging glaciers and rapidly widening crevasses. Finally the porters refused to carry any higher. An attempt on Carnicero (19,615 ft.), to the left of the ice-fall, failed at an enormous crevasse extending right across the mountain face. On July 24th the last and highest camp was pitched at 17,000 ft. at the edge of the upper basin of the Sarapo Glacier.

The climbing party left camp in darkness on the morning of July 25th and started up Sarapo on two different routes. But only Bachmann and Lugmayer were able to attain the cornice-crowned summit over the south-east ridge, having first conquered the north-east face of that ridge with some difficulty. Thus Nevado Sarapo (20,150 ft.) was climbed for the first time. The climbers fought their way back to camp through snow and hail showers. Two days later everybody was safely back at Base Camp on Lake Carhua.

After this success, a well-earned rest-day was taken at Base Camp III on Lake Carhua, whose sparkling waters mirrored the four 6000-m. peaks of the massif, Siulá, Yerupajá Grande, Yerupajá Chico and Nevado Jirishhanca.

Emilio Angeles, the head porter, now set off to Queropalca, the nearest large village in the valley, in order to hire pack animals. In spite of the reduced quantity of baggage, we still had need of a dozen or so animals and they are difficult to get in this region.

We had neither time nor stores for an attack on the two still unclimbed 6000-m. peaks, Jirishhanca and Yerupajá Chico. It was impossible to buy anything but milk and mutton on the mountain pastures; it took two days journeys to get potatoes and our high altitude food had rapidly depleted owing to the unforeseen prolonged march up the Sarapo Glacier. July was nearly out and five of the climbing party had to be back in Lima at the latest by August 10th in order to catch the boat for Europe.

We were attracted by Jirishhanca, which resembled an ox-horn sticking out of a black rock skull. We explored every possible route with our field-glasses

again and again, if only to have the satisfaction of climbing it in our minds. But all the routes, up the huge face of some 6500 ft., in the great south-east couloir, along the east ridge or via the north-east arête of the lower summit, seemed hopeless. We were finally forced to the conclusion that there was no possible route on this mountain which held out the slightest hope of success. There was no possibility of getting porters even near the start of the real difficulties; no hope of climbing the difficult part even if we got there, as it was mostly of Grade 6 standard; and in any case no one could stand three or four bivouacs with insufficient equipment. Nevertheless, we are of the opinion that it will undoubtedly be climbed one day, given sufficient perseverance and very considerable luck.

Next day, as soon as the night's frost had dried out from the tents and equipment, we began packing up.

In spite of our numerous misfortunes we did not seem to have learned anything and still relied on verbal promises. It was mid-day before the first pack animal appeared round the great terminal moraine wall at the foot of Lake Carhua. In my opinion it was now too late to start. We paddled in the dark green water of the lake but it was too cold for bathing. One of our porters became ill and on the second day it turned out that he had pneumonia.

The unforeseen delay, the sick porter, the anxiety of the others who had already had enough of ice and stone falls, loneliness and heavy loads, all this was depressing in the extreme. But suddenly like a bolt from the blue two fine 5000-m. peaks literally fell into our laps, a success which we hardly dared hope for under the present circumstances. Aeberli and Mariner climbed Little Jirishanca, and Gruber and I climbed Ninashanca, a fine peak at the northern end of the chain.

Viewed from the south, Little Jirishanca looks like the perfect model of an ice mountain. A steep wall of fluted ice rises sheer to the summit above a heavily crevassed glacier, without a break. Erwin Schneider had especially drawn our attention to this mountain.

The climbers left camp on July 29th while it was still dark and had already reached the ridge by daybreak, crossing over to the north side. A small green lake lay in among the scree at the foot of a steep glacier coming down from the east arête. The sérac zone in the centre portion was circumvented by an ice-chimney, after which the route was open but somewhat menaced by tottering ice-pinnacles. A certain sense of security was afforded by the knee-deep "nieves penitentes". At length the foot of the east ridge was gained. Here slabby rock alternated with fluted ice and this in its turn gave way to verglas and dry powder-snow which broke to dust under the crampons. The fluted ice-rib became narrower and finally terminated in impossible slabs. They had to retreat and make a traverse on rock round a corner, whence a gully led them up to the shoulder

below the summit. Once more a pitch of vertical slabs held them up, forcing them over on to the inhospitable south face. Finally they reached the top, bathed in tropical sunshine, by means of a narrow icy crack; the height was 17,930 ft.

Meanwhile the rest of the party had crossed a high pass below the Great Yerupajá, of about 15,750 ft., into the valley of Rollopata. Here lay a beautiful moss-green lake called by the shepherds Lake Mitu, which was not on any map. Further on we found another lake, emerald green in colour, called Nina Lake. The mountains were full of glacier lakes but none were of such intense dazzling colour as was this one. The word Nina is of Quechua origin and means Fire. The glaciers flowing to the north and north-east from Jirishanca and Rondoy terminate in it. We established Base Camp IV in a meadow just above the valley floor.

Soon after lunch Gruber and I were on the way up to the ice-covered ridge from which the north-east arête of Ninashanca soars to the summit. The corniced edge rises up between unclimbable slabs and at once attracts the attention of the expert eye. It *must* go!

We advanced our camp up to about 16,400 ft. and dug a place for the tent in a snow hollow just below the cornice. The porters quickly put it up and hurried down the steep rocks to Base Camp so as not to be overtaken by nightfall. I made a brief exploration of the ridge. The magnificent pink of the evening began to illuminate mountains and corniced ridges all around; the sun, like a red orange, shone on endless mountain chains to the west and violet jade-coloured night crept up from the Amazon lowlands. Never had I been so affected by the beautiful and illimitable Sierra as on this lonely evening walk along the corniced ridge of Ninashanca, the backbone of the continent.

Suddenly I came upon a large crevasse which completely split the crest of the cornice. Even if it were possible to reach the bottom on a rope the ascent of the other side would involve some long and very difficult climbing up perpendicular ice. My little reconnaissance had proved its value; we would have to find another route tomorrow.

The tropical night engulfed the mountains like an icy wave. I hurried back to the tent and we talked long into the night.

We started off the next day as soon as the sun's rays reached us and traversed the face just below the ridge, finally reaching it above the crevasse by means of a steep ice-gully. The second tower on the ridge rose above us, menacing and dangerous. We belayed on icicles, backed up crevasses, hacked out tunnels through the cornice, never daring to think what conditions would be like when we had to descend in five or six hours time, with the hard "nieves penitentes" softened by the tropical sun.

We made rapid progress along a fine stretch of ridge and were then forced over to the east face by overhanging cornices. Whenever the slope faced south we

were up to the waist in deep powder-snow. This snow, and a slope of breakable crust encountered later on, served to remind us that we were at a height of over 18,000 ft. We were obliged to cross two more huge crevasses, each time on all fours on very thin bridges.

An icy wind tore at our clothing and in spite of the blazing sun we were thickly clad, but we willingly accepted the cold with its guarantee of security on the steep slopes and the promise of unaltered conditions for the descent, which in fact was fulfilled. This was the coldest and windiest day of the entire expedition, but in spite of this we were able to achieve more than when exposed to the scorching blast of the tropical sun. At last, at about 11 a.m., we set foot on the summit of Ninashanca, 18,490 ft.

The following day the party set off to the north, through the green valley, and soon encountered the track leading from Chiquian to Queropalca. This abominable track is cut through a steep gully with vertical limestone walls and zig-zags up to Cashapunta, a high pass of about 14,750 ft., constituting the watershed between Pativilca (Pacific Ocean) and the sources of the Marañon (Atlantic Ocean).

The caravan wandered slowly westwards along the luxuriant green valley of Llamac, through the village of Pogpa. At about an hour's journey above the unused bridge in the Pativilca Valley, the expedition came back to its starting point. Apart from the peaks climbed and the scientific achievements, the complete navigation of the whole range on horseback was a feat in itself and of considerable importance, as we were able to visit the unexplored valleys to the north-east of the chain as well as observe from all directions the three great problems of the Huayhuash Cordillera, Yerupajá Chico, Jirishanca and Rondoy. Unfortunately there was no time to climb them and anyhow conditions were extremely unfavourable.

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REMAINS OF OLD ICE SHEETS CONSTITUTING PLATEAU GLACIATION IN THE TROPICS

Observations in the East Cordilleras of South Peru

By H. R. Katz

The formation of ice caps is common to nearly all areas of the globe, but to-day they are a characteristic of Polar and sub-Polar regions. In former ages however, glaciation also occurred in tropical regions such as the central Andean highlands of Peru and Bolivia and of the same type as the ice caps of to-day in the Arctic and Antarctic. When the ice retreated from the Andes, the only glaciation left was in the form of isolated ice caps on the summits of high volcanoes in Ecuador, Peru and Bolivia. The finest examples in Peru are to be found on the Nevado Coropuna (19,690 ft.) and Ampato (19,680 ft.) north of Arequipa. Ice cap formations also occur in mountain chains such as the well-known Cordillera Blanca, culminating in the 22,240 ft. high Nevado Huascaran. They are invariably restricted to the summit areas; actual inland ice, i. e. "ice sheets", coherent ice covers extending over large flat areas between the mountains, no longer exist in the tropics so far as we are aware. A formation of this type, the furthest from the South Pole, must be the ice sheet of Patagonia, stretching between 46° and 47° southern latitude, from which glaciers run down to the sea.

We were therefore considerably astonished to meet with glaciated areas in the East Andes of South Peru, which appeared to belong to the type of flat highland glaciation, characteristic of Polar regions. This phenomenon was described by our companions as "una enorme pampa de hielo" (a huge plain of ice). The Spanish word "pampa" as defined by the Andean populace, means a more or less flat area, either large or small, either in the lowlands or above 3000 m.

The geographical position of this ice plateau is approximately 14° 05' S and 70° 45' W and at a height of about 18,000 ft. It is located just where the ice-clad mountains turn south to the east of Nudo Ausangate, later joining up with the glaciated chain of Nudo de Vilcanota. This area is only inaccurately shown on the incomplete maps and we were only able to observe the ice plateau from a great distance. However, from the summit of Nudo de Quenamari (19,190 ft.)¹

¹ Height taken from the 1:1,000,000 map of the American Geographical Society of New York, sheet D. 19 "Puno-Rio Beni". According to our uncheckered aneroid readings the mountain is somewhat lower, although it is given as 19,193 ft. (5854 m.) on the 1:5,000,000 "South America" map of the National Geographic Society in Washington, edition of October 1930. The Peruvian Carta Nacional del Servicio Geográfico del Ejército 1:200,000 does not include our Nudo de Quenamari and the above mentioned ice plateau is hardly outlined in sheet 141 ("Siemasi").

lying to the east, we noted that it was an extensive and very wide plateau terminating in two flat mounds. The plateau, together with some low undulating mountain ridges that radiate from it, is covered by a large and coherent ice sheet from which several glaciers descend into lateral valleys. This "pampa de hielo" is an imposing spectacle even from a distance of from 20 to 25 miles. In appearance it closely resembles the Arctic plateau ice sheet which we have encountered on former journeys in East Greenland at the edge of the great ice cap and elsewhere.

But the mighty chain of the East Cordilleras (Cordillera de Vilcabamba, Cordillera de Vilcanota and Cordillera de Carabaya, continued in the Cordillera de Apolobamba and Cordillera Real of Bolivia) is very little known today, and this also applies to the remote but more easily accessible broad and steppe-like intra-Andean highlands of South Peru. In particular the terrain lying to the East of the main road from Cuzco to Lake Titicaca rarely drops below 13,000 ft. in height, and since any precipitation reaches the Peruvian and Bolivian Andes from the East, it is hardly surprising that the East Andes are subject to greater glaciation, which reaches a lower level than is the case in the West Andes.

This terrain is of the utmost importance both from a glacio-geological as well as a purely glaciological aspect. J.A. Douglas¹, who crossed the East Andes in this area in 1929, during an expedition to the tropical valleys around this region of Quincemil, gives a very comprehensive description of it. He travelled along the West side of our ice plateau and, as he only saw it from below, describes it as "a continuous snow-covered ridge". He rightly realised, however, that this extensive highland region must have been covered by a far-reaching ice sheet at some former date and that the depression had been completely filled by this "confluent ice-sheet" to a very great depth. Douglas also came to the conclusion that the coherent ice sheet, which even today extends over flat highland zones, formed the remains of the old intra-Andean ice sheet of former days.

We reproduce below the text of the most important part of his observations. (Pages 315-316.)

"Midway between the two Cordilleras lies the bleak and isolated hacienda of Chua Chua. At this point we enter a region covered by vast mounds of morainic material, and probably nowhere else throughout the whole of the Peruvian Andes is there such clear proof of the former wide extension of the glaciers as is to be found here and in the corresponding district north of the Vilcanota knot. The whole of this intermontane area has been the dumping ground of innumerable glaciers, the shrunken but by no means insignificant remnants of which are now visible in a continuous snow-covered ridge on the north and east, more than half

¹ J.A. Douglas: *The Geology of the Mantapasa Valley in Eastern Peru*. *Quat. Journ. Geol. Soc. London*. No. 335. Vol. 49. Part. 3, August 1955, p. 308.

a day's journey distant. Huge crescentic terminal moraines and long esker-like ridges, containing a great assortment of rocks foreign to the district, succeed one another in endless variety, while high up on the hillsides perched erratic blocks indicate the former great thickness of the confluent ice-sheet. Indeed, were it not for the visible trail of these boulders it would be hard to picture any directional movement of the ice over a country so devoid of definite lines of drainage. Large tracts of relatively flat, swamp-covered ground, the result of solifluxion, form a somewhat unexpected feature of the landscape and materially add to the difficulties of transport at these high altitudes."

Undoubtedly we are here face to face with the characteristics of a comprehensive pleistocene glaciation of a former age. Large tracts of highland basins were completely filled up with ice, which in its turn joined up with ice masses of other basin systems across plateaux and flat mountain ridges. The highest parts of these ridges stood out above the vast desert of ice like isolated nunataks, so frequently encountered in Greenland today. At a later date the ice almost entirely disappeared from these Andean highlands and now it is confined in the main to hanging glaciers and valley glaciers. Nevertheless a few remnants of the former ice sheet would still appear to exist, as witness our discovery of last year.

In our opinion the whole subject is worthy of consideration. First and foremost comes the question of cumulative build-up; is the present local formation of *névé* sufficient to offset the effect of ablation of the ice sheet in spite of its great height? Or does it receive contributions from some contiguous source unknown to us? An accurate cartographical survey of the area, possibly from the air, would seem to be of paramount importance both as regards a superficial estimation of the whole ice sheet as well as for determining the relative heights. At the same time the direction of flow could be judged, and later on the amount of ablation and speed of movement estimated from glaciers coming down from the ice sheet. Furthermore it would be of great interest to determine the thickness of the plateau ice and also the relief of the lowest sub-strata. Local climatic conditions must also be closely examined if the origin and the present existence of such a large mass of ice is to be clearly understood. No doubt a study of the solifluxion and the development of the vegetation in this wide and remote pre-glacial area would bring forth many new and interesting aspects, always bearing in mind that we are dealing with the tropics, which are productive of conditions differing vastly from those obtaining in more temperate zones or in Polar areas.

BEYOND THE ARAWATA

(Across the Southern Alps of New Zealand)

By John Pascoe

Alpine climbing in New Zealand has a variety of interests. The Southern Alps stretch in a glaciated chain with the contrast of dry sheep country to the east in Canterbury and Otago, and of rain forest and gorges in Westland. The sub-ranges are as complex as the Main Divide. The mountaineer must add the technical ability of the alpinist to the curiosity of the pass traveller. This combination of skills is valuable training for the Himalayan climber and in New Zealand is rewarded by new transalpine expeditions when peaks are traversed, remote valleys descended, and the attendant problems of bush navigation, river crossing, and heavy swagging¹ are solved with good humour and persistence.

Every fourth peak I have climbed in the last twenty-five years has been virgin, but to-day our "golden age" is closing and unclimbed mountains are indeed inaccessible. There remain many new routes, and in many valleys the peaks present unclimbed faces. The climate is severe and unpredictable, and the north west storms account both for the extensive glaciers and the tangled bush. The snow-line is 3000 ft. below that of the mountains of Central Europe, so that the relatively low height of New Zealand peaks is no indication of their difficulty. The broken natures of the icefalls, which often give the most practicable routes, enforce a high standard of snow and icecraft, but the rock in many districts is so loose as to be untrustworthy, and continuous *abseils* of several hundred feet are virtually unknown. Some rocks are so shattered that to force a piton into them would be at the risk of starting a rockslide. The bush varies from open beech forest to dense rain forest, but the sub-alpine scrub is consistently vile. The unbridged rivers are swift and hazardous and have claimed many lives of explorers and climbers alike.

Access to the Southern Alps is uncomplicated in the tourist areas. Air, rail, and road travel routes are convenient. Outside these areas the access is primitive, the tracks are often overgrown, the huts are small, and the transalpine climber must be able to carry 65 lb. in any country and to improvise camps with tents or with snow-caves at high levels. There are first-class guides in New Zealand but they are few, and the greater part of the alpine population climbs without them.

¹ A swag is a pack or rucksack and its weight is a feature.

Mountain clubs are strong and their huts are usually the only shelter in unfrequented areas. The clubs pay great attention to the training of novices in all crafts of bush, rock and ice. The annual magazines of the New Zealand Alpine Club and of the Canterbury Mountaineering Club have a high standard. Much of the narrative in this paper is based on an article in *The Canterbury Mountaineer*.

Tourist alpinists are few in number. Guide books are only in their infancy but are useful in stimulating new club members to activity. New Zealand women have shown great ability at swagging as well as climbing. Men and women are usually good cooks. Professional deer killers are paid by the Government to exterminate herds of red deer and chamois that cause damage to plant life, resulting in erosion, but the country is so difficult that even control is not yet achieved. The deer killers are sometimes good mountaineers and always good bushmen. The musterers (shepherds) of high country sheep runs make another group of self-reliant mountain men.

The expedition I now describe is characteristic of New Zealand mountaineering and pass travel. It involved an overland journey across the Main Divide and sub-ranges from one province to another, with every problem of icefall, river, bush and gorge, and through terrain where there were few tracks. We used no huts, had no food caches or air-dropped supplies, and for three weeks did not see any other men. To reduce our swags to 65-lb. weight with equipment including a "yak" tent, a slasher (bush knife), 170 ft. of rope, primuses and fuel, first-aid kit, spare clothes, pressure cooker, snow shovel, three cameras, and crampons took some ingenuity. We carried some primus fuel in the tubes of our pack frames, packed all food in light plastic bags, and used every device to lighten our loads without reducing our efficiency. Our food list was worked on a basis of 1½ lb. a man a day, with a staple diet of dehydrated meat and vegetables, bacon, oatmeal, tea, sugar, rice, beans, milk powder, biscuits, chocolate, dates, flour, cheese, butter and salami with an overall calorific value that proved sufficient for the heavy work of taking loads over high ranges and through deep gorges.

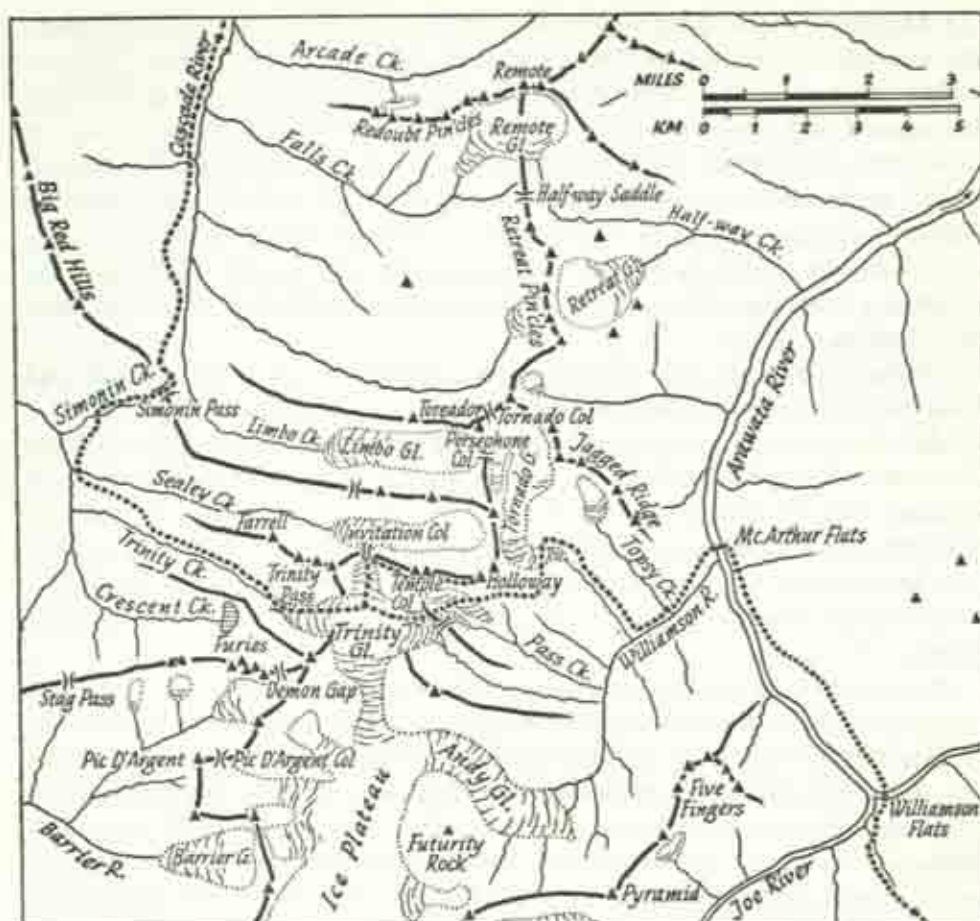
Preparation for the trip included the typing on rice paper of route notes and information in case storms, accidents or mischance drove us to escape from inaccessible valleys by new or difficult ways. None of us had travelled in our main objective, the Arawata Valley, and parts of our route had never before been used, while others had been traversed by pioneer gold prospectors and exploring mountaineers. Our leader was Stan Conway (about forty). I was forty-four. The other two, Bill Hannah and Ray Chapman, were near thirty. The total cost of the holiday for each man was about £15. We had all some experience of climbing and pass travel, and although severely wounded in the shoulder in the last war, Conway had overcome his injury with great fortitude.

Our journey began behind Lake Wanaka in Otago, continued up the Matukituki Valley in the shadow of Mount Aspiring, crossed to the Arawata River and the Olivine Ice Plateau, and reached the Tasman Sea at Jackson's Bay in Westland after a tussle with gorges in the Red Pyke and Cascade valleys, where the annual rainfall was 300 inches. For the first time in our experience we had perfect weather marred by only one day's rain, and we were able to maintain a strenuous schedule with many nights of only six hours' sleep and with only two rest days. Most of us lost a stone in weight, not because we were too fat but because the continuous wrestling with swags in bush, gorge and icefall fines down the most active bodies.

On the night of the 20th December 1952 we left the end of the formed road in the Matukituki Valley, and camped in the open under a giant rock bluff, with the dark beech forest merged into night, and the stars clear far above summit silhouettes. The next morning we rose at 5 a.m. and got away after a quick breakfast. We covered many miles that first day, but the swagging was over easy grass flats and through good bush tracks, with a low river to cheer us, and the heartfree gratitude for a return to the mountains after a year of city and family life. Distant clouds wreathed peaks of snow, and our only long spells were for meals and rest.

By contrast the 22nd December was a day of vertical toil. We really felt every one of the 65 lb. as we pulled ourselves up a steep bush track where glimpses of the Matukituki Valley made us think enviously of the level going of the previous day. When we reached the grass line we found easier walking, but we could not make camp till we had lost 600 ft. of height to avoid an impossible sidle along rock bluffs. The third day was as hard up the steep southern slopes of the Arawata Saddle where every precaution of taut rope and shaft belay was necessary to make climbing safe. To lose balance with a 65-lb. swag is not to recover. On the Westland side of the Arawata Saddle (5340 ft.) we walked down to a level grassy camp site where a large rock gave the tent shelter. Below lay dangerous bluffs, and in case a storm forced us to descend them I made a cairn to mark a practicable route. Across the valley Mount Athene, only once climbed, glistened in the late sunlight. Twilight delayed darkness till after 9 p.m. I slept outside, and *keas* (mountain parrots) perched playfully on the toe of my sleeping-bag cover. We slept deeply, as always after heavy swagging. All too soon it was dawn and time to move.

On Christmas Eve we cramponed up steep snow to a couloir route to the Snow White Glacier. Halfway up there was a vicious bulge where Conway cut steps and hand-holds without a pack, secured a shaft anchorage and pulled up our swags and us individually. At the head of the couloir we brewed coffee on a shelf of rock and admired the contours of Mount Barff above the Arawata Saddle.



We traversed pleasant snowgrass ledges to a minor glacier, beyond which lay a rock gut and bluffs which gave rope work and a bypass. Steep sidling led to a clear view of the Snow White Glacier and we crossed over a bluff to a rock terrace above a deep icefall where the keas delighted us by flitting on inaccessible séracs.

Christmas Day was our easiest for some time, because the route across the middle of the Snow White Glacier was good going with crampons, we made height steadily, and were heartened by views of incomparable Mount Aspiring (9957 ft.) with its white shaft against the blue sky. On Mystery Col we built a tent wall of rocks and far to the nor'-west we could see future objectives on the Northern Olivine Range. But we had an appointment with ourselves on the Main Divide above us, as we wished to see something of the Dart Valley peaks.

Accordingly the 26th December saw us away at 4.45 a. m. to a simple trail through the upper Snow White Glacier, where from the Whitburn Glacier, we climbed Mount Maoriri (8490 ft.), and saw a galaxy of peaks from Mounts Aspiring to Tutoko, and some of the tangled bushed country where our stamina would be tested. By noon we were back at Mystery Col and after a good stew hauled on our full swags and descended a creek to a small gorge where we had to use the rope to climb to safer slopes.

Here we rested near tarns in the snowgrass, and enjoyed one of the grandest views in the Southern Alps. The Snowball Glaciers perched and brooded above grey cliffs, chasms, and creeks with scrub of varying hues of green. The Joe Branch of the Arawata flowed from a gorge and below us lay Williamson's Flat. We left the snowgrass for the bush above the flat and saw a gorge which had a bad reputation among the few who had traversed it. In the bush we found a deer track and the slasher marks of a previous party. As we lost height the forest grew taller and the bird life more abundant, and I thought how appropriate Bach's "Mass in B minor" would sound performed in such a setting. Tired, thirsty but with a sense of achievement we reached the flat at 1400 ft. We camped on a sandy bank of the main Arawata River, conscious that we had descended 7000 ft. from our peak on the Dart Divide. The weather stayed fine and the sparks from a wood fire leapt towards the stars. The first stage of our trip was reached and we were content. Our party had welded into a team.

Our situation the next morning was perfect. Williamson's Flat is known to gold prospectors as the "Thousand Acres Flat" and its expanse of tall grass, uncropped by grazing animals except a few deer, is all the more attractive for being barred by glaciers above and gorges below. Few men have been there since explorers like Charles Douglas had reached it in the eighties. It is perhaps fated to be accessible to aircraft, but till then it remains unspoilt by men or habitation. As the heart of a wilderness area it is cherished by climbers. We delayed lifting camp till sun had flooded the flat with Mount Ionia clear up the valley. At 9 a. m. we forded the Arawata River and spent the rest of the day traversing a gorge where the difficulties proved more agreeable than expected. By the late afternoon we had camped at McArthur Flat, 1080 ft.

At this point the major hazard of our holiday could be heard rumbling swiftly to another gorge: the great blue tumult of the Arawate River which now drained the vast Olivine Ice Plateau and the Williamson Valley. The next morning, the 28th December, we prepared for our troubles. Cameras, tobacco, matches and such were packed in several layers of waterproof bags, wrapped in sleeping-bags which in turn were rolled tightly in waterproof covers and all our pack contents tied inside our waterproof swags. We reduced our clothes to singlets and shorts, coiled up a total length of 170 ft. of nylon rope and took stock of the fords.

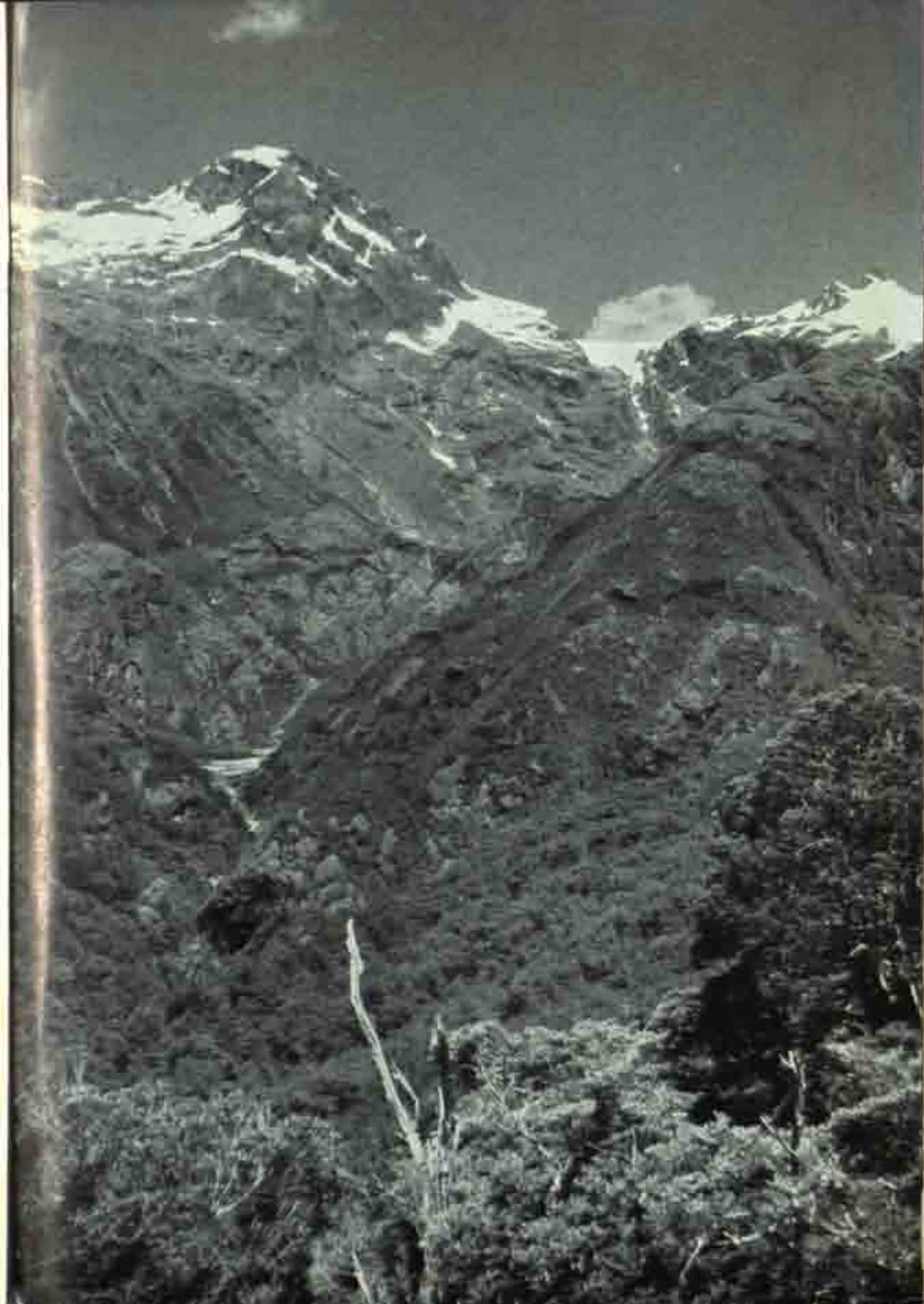
Conway tried a direct crossing but near the far bank he reported a deep gut of water to be too swift and deep. On the return to us we took in the wet slack of the rope, he stumbled in a hole and got a ducking.

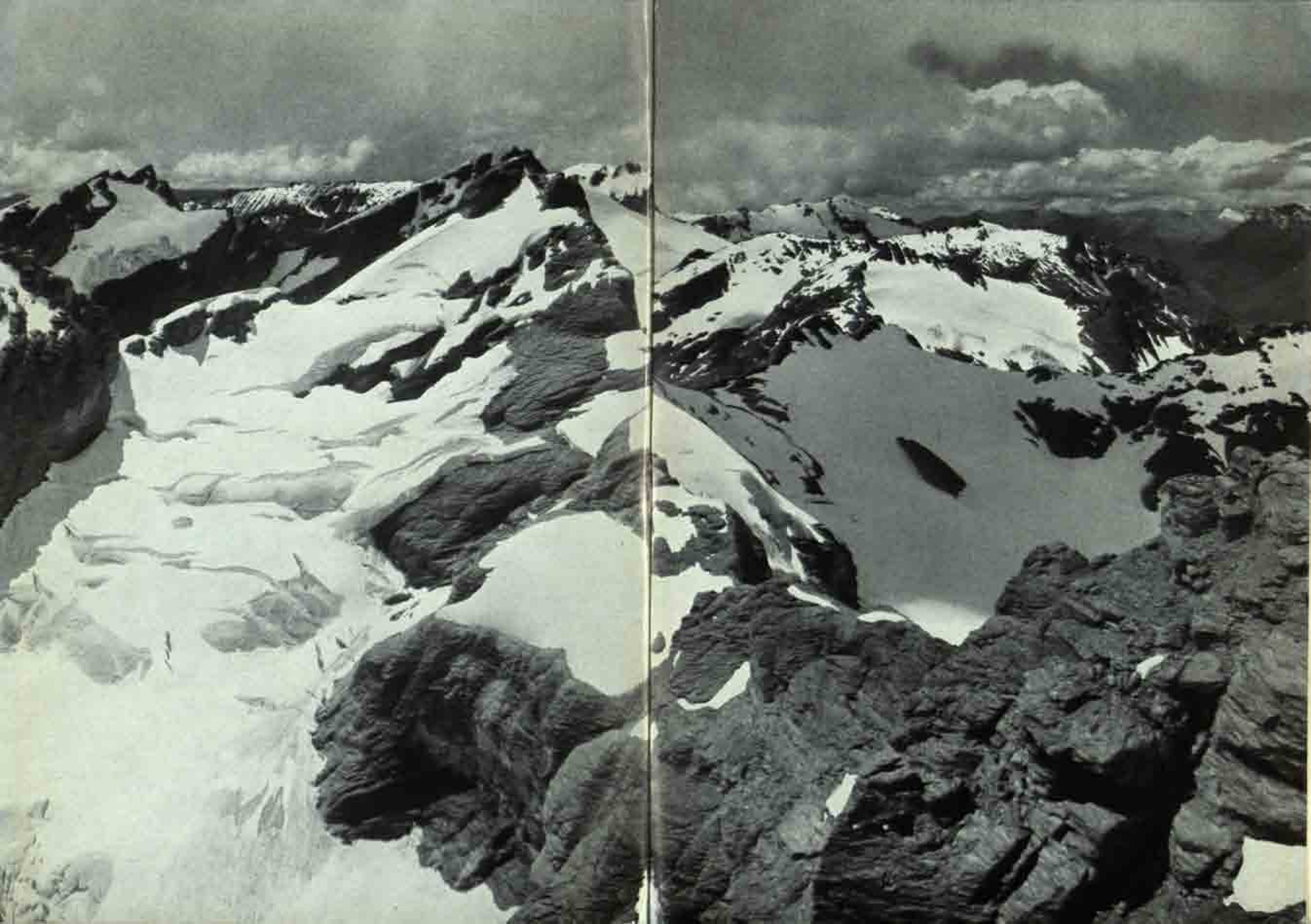
The next attempt was on a long diagonal ford, perhaps 400 ft. long, with the full force of the glacier river concentrated in the centre. We crossed as we would a crevasse bridge of doubtful strength, that is, moved in turns on the rope. Conway and Hannah secured themselves as one unit in slack water, and payed out the rope to which I was tied, with Chapman linked with me in support. We loosened our pack straps.

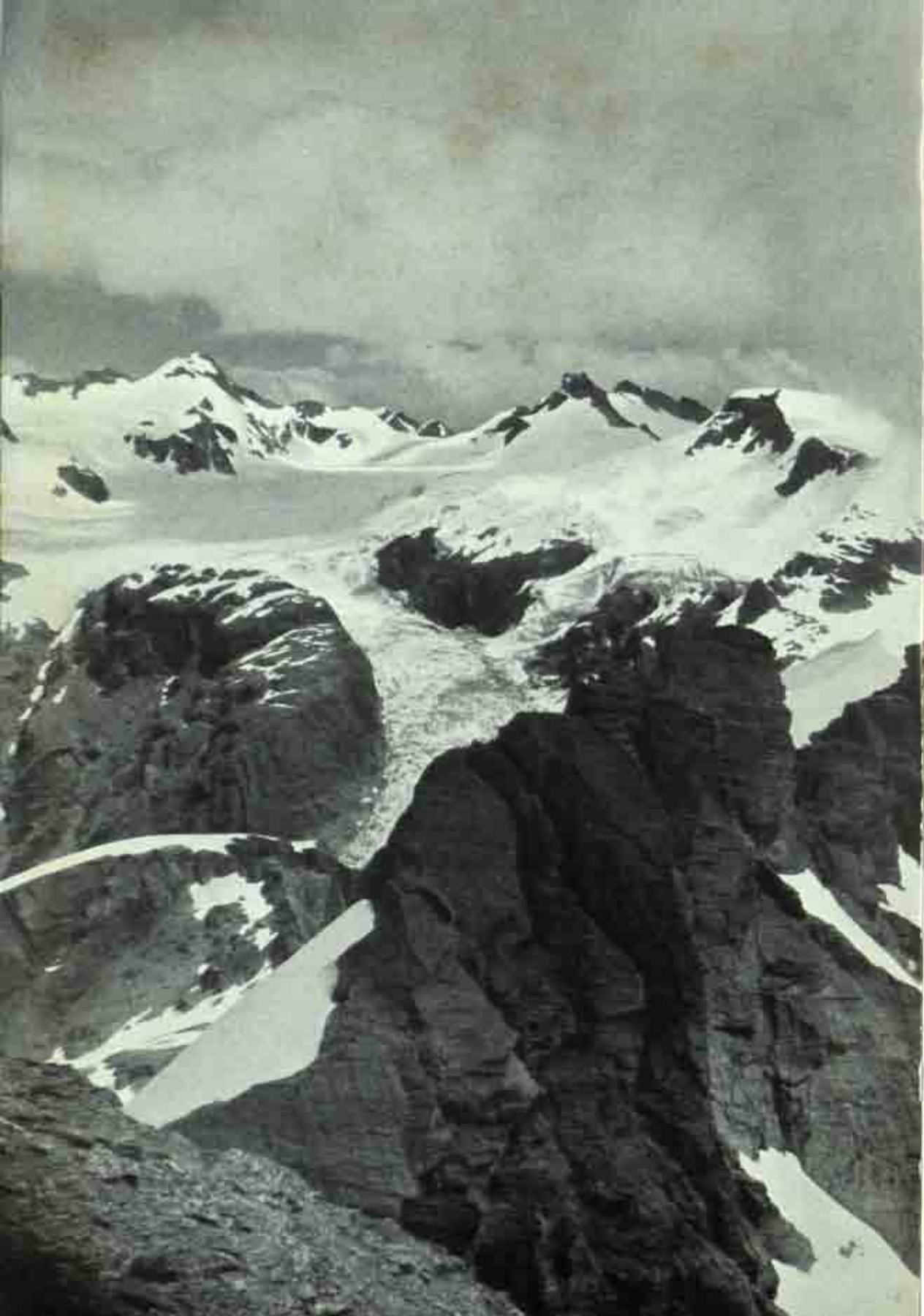
Chapman and I made the first third of the ford with some confidence, and when the rope was fully extended, we anchored ourselves in the current on legs numb from the ice water, our swag weight helping secure us. As Conway and Hannah slowly worked down stream to join us we took in the coils of the rope. Then they again stopped and Chapman and I began the second and most dangerous part of the ford. This was fearful. The current grew swifter and the river deeper. Uneven and slimy boulders at our feet threatened to throw us off balance. Worse still, the river caught the slack of the rope and bellied it down stream. Each surge of the river was a tug of the rope. This powerful tug *backwards* was as though a tug-of-war team was trying to wrest me from every foothold that our combined strength gained. We used every latent reserve of strength and I found myself panting as though I was trying to push a truck uphill. As the river surged away, sapping our energies, we waited grimly in the current for our friends to join us. The third section was easier. Safe on the bank we lunched. The full ford had taken half an hour. I found it difficult not to break down as a result of the nervous tension. We stumbled up to a bush terrace, found some dry wood, and got a fire going. After a smoke and a feed we felt better. In the afternoon we swagged up a gorge where steep sides and large boulders made walking slow. We camped where we could cut carpets of deep moss as mattresses in a beautiful rain forest.

Another day of bush and river work was alternated with grass flats and we camped by a noisy creek. The swags were down to 55 lb. and we were up to schedule. Rain and thunder on the 30th December were most welcome as they gave us an excuse for rest and sleep. The cooks got wet but the tent and fly gave dry shelter. The rivers rose and roared defiance. The storm cleared early the next morning, and we were glad not to have to cross the flooded Williamson. We packed up and climbed up dense trackless bush, up faces so steep we tugged at every root for a hold and squirmed through the scrub. At noon we could see

Plate 37: Ascent of the Arawata River through the Williamson Valley. Mount Gable in the background.







back up the Arawata Valley and across to the head of the Williamson and Mount Gable. Near the last of the scrub, Conway and I dumped the loads and made a reconnaissance above, to find we had unwittingly reached the terminal face of the Tornado Glacier and would have to find a new route to Trinity Col, our key pass on the Northern Olivine Range.

When we had crossed the glacier we climbed a spur to learn that cliffs and bluffs complicated progress and we took it in turns in pairs to reconnoitre. After some exhausting prowling we camped near a dry creek-bed where the quiet stillness, striking alpine panoramas, uncertainty about the next day and the urge for sleep all jumbled up. After what seemed only five minutes but must have been six hours it was time to rise in the first light of dawn for what became a hard day.

It was New Year's Day 1953 and we had sixteen hours of swagging and probing and some ice climbing of unusual interest. As we gained height a series of terrace glaciers fell over cliffs, and great crevasses split the neves. At one place Conway and I plugged steps over wispy bridges while our friends relayed the swags to our assembly point. When we rejoined them we climbed in pairs, and moved one at a time, belaying carefully. The worst obstacle was an unbridged crevasse, into which I abseiled with a karabiner, and crossed on fallen blocks to cut up the other side. Chapman came down also, and we spent some time examining the rest of the route and returned with hopes of success. Unfortunately we had no ice pitons, so Conway and Hannah had to spend three hours hacking away yards of ice to make a staircase down the crevasse wall. By 6 p. m. we swagged through the rest of the icefall and looked sadly where ice blocks were poised to shoot over cliffs. Our only way lay up a pitch of steep rock, across which a snow-water stream flowed. Chapman reached a snow tongue and anchored the full rope lengths. We climbed one at a time, conscious of pack weight and the need for care. More steep snow in mist landed us on Trinity Col, where we excavated a tent site on rock and cooked in a dreadful huddle of primus fumes and tobacco smoke. Our new route to the Col had proved exciting work.

In clear weather the next day we revelled in sunbathing, rest, and photography. Our high camp was a salubrious place. Far south-east we could see the Arawata Saddle, as remote as the future. Above rose further objectives. On the 3rd January we cramponed to Invitation Col, where the distant Red Mountain was pivot for the last stage of our trip. We had a second breakfast on Mount Temple, a second ascent. A traverse towards the virgin Mount Holloway gave very steep snow faces, where above crevasses we moved one at a time, sometimes facing

Plate 58: View from Mount Holloway north-north-west towards Mount Typhoon and Mount Torondor beyond the Limbo Glacier.

Plate 59: View north-north-east from Mount Holloway of the Tornado Glacier and Jagged Ridge.

Plate 60: View west-south-west from Mount Holloway of Mount Temple and the Olivine Ice Plateau.

inwards. Finally on steep firm rock we completed our pioneer ascent of Mount Holloway, the last stronghold of the Northern Olivines. Views of the Andy Icefall and of Mounts Destiny and Climax on the Olivine Ice Plateau were as spectacular as the panorama of Mounts Matador, Typhoon and Torcador. Immediately below lay the unvisited Sealey Valley, with an uncrossed pass to the Limbo Glacier to be referred to future parties. We finished our day by retraversing Mount Temple back to camp.

For the rest of the journey to the Tasman Sea there was no respite from swagging over ranges and through gorges, and climbing without loads became a happy memory. We took farewell of the Williamson peaks, emptied primus fuel from pack frames and made a tally of provisions in their neat plastic bags. Our crossing of Trinity Col on the 4th January began with an easy snowfield, passed a small tarn with ice floes and showed us the head of the Red Pyke Valley. Down in the grass meadow of Trinity Creek we pitched the tent. While the others cooked the stew I made a solo reconnaissance through an untraversed gorge and returned with the good news of a feasible trail for the next day. We rose at 3.30 a. m. and used my route through the gorge till scrub forced us from a glimpse of Stag Pass into the floor of the Red Pyke Valley. Bushed bluffs gave some trouble. Swift blue water contrasted with the red rata flowers. Rare *kakas* wheeled overhead. In the afternoon we picked up a cairned route made many years before by William O'Leary, a legendary gold prospector known as "Arawata Bill". We camped on a mossy flat where blue mountain ducks and ducklings frivelled in our water supply.

On the 6th January we crossed Simonin Pass on the flanks of the Red Mountain. Tired muscles forced us to an hour's sleep at noon. Our first panorama of the Cascade Valley showed a line of gorges that would be exacting. *Keas* nibbled our crampons, by now useless ironmongery in this new environment of scrub, rare minerals, rare birds, and waterfalls. We sidled over rocks and raw asbestos under the Red Mountain and dropped to the Cascade River to a good camp. In the evening we yarned round a fine camp fire, talked of the Himalayas and of our friends, and knew the last leg of the holiday would be eventful. The next day lived up to this promise. We followed deer tracks till they ended. Few beaches of the river gave even a hundred yards of open stumbling and usually the narrow walls of rock gorges forced us up slimy faces overgrown with thick scrub. In the late afternoon we reached the flat of the White Slip.

At dawn on the 8th January a chorus of strange bird songs woke us for another day. Below the flat the whole river tumbled over a waterfall of 150 ft. We inspected this natural power resource, seen by few New Zealanders, and admired boulder dams, spillways, and deep pools. To pass the waterfall took a climb of 1000 ft. and three hours sidling on fallen logs, mossy boulders, and through

second growth. In some places it took an hour to make a hundred yards. Scrub tore our clothes, and Hannah had to mend his pants. We were relieved to reach grass flats and camp. For the twelfth time on the trip I slept in the open outside the tent.

Our last day in the Cascade Gorges was easier because the river was slower and we could wade under bluffs arm-pit deep in water. At Woodhen Creek we fed and picked up a horse track used by cattle farmers. In the evening we smelt the Tasman Sea and located the Cascade homestead, an empty out-station in open country. The 10th January and the twenty-first day of our expedition gave us a walk of twenty-seven miles, with a good track over the Martyr Saddle and down the Jackson Valley with sun and many grass flats.

When we reached the road bridge over the lower Arawata River and saw its vastness of water and shingle offset by distant ranges we knew we were "home and dried", to use a New Zealand expression. We took snaps of each other and started on a nine mile road walk to Jackson's Bay. At 9 p.m. we reached journey's end, and two penguins waddled up from the Tasman Sea as if to greet us. A road-mender gave us fresh bread and butter and a stale fish; he was the only inhabitant of a settlement that once numbered several hundred people.

I slept outside and at dawn was rewarded with a view of Mounts Tasman and Cook. A friendly settler collected us in a truck and took us to the Haast River settlement, where we took a final photograph and flew to Hokitika for a train back to Canterbury. Thus ended the hardest trip of my mountain life. I was grateful both to members of the New Zealand Alpine Club, who had given us information, and to my fellow companions of the Canterbury Mountaineering Club, whose unselfishness and enterprise had made a successful trip. If we had regrets they were that we were too busy with swagging to have had time for collecting botanical or insect specimens. We did not take bearings for maps. Always there was the thought "this weather cannot last; if we don't get over that range or down that gorge, we can get caught in a trap". Most spells were used to recoup energy for the trials ahead. Primarily we were mountaineers covering country, and to have undertaken scientific observation would have meant an expedition of a different character with more time and with air-dropped supplies. We were grateful to have indulged in a New Zealand holiday with its advantages in pioneering in country of some diversity.

John Patcoe. Biographical note: Born 1908. Law clerk 1927-1937. Government historical research work and editorial work since 1937. Illustrations Editor of *New Zealand War Histories*. Author of *Unclimbed New Zealand; The Mountains, The Bush and The Sea; The Southern Alps (Part I)*—route guide, and *Land Uplifted High*. Member of the New Zealand Alpine Club, the Tararua Tramping Club and the Canterbury Mountaineering Club. Lives in Wellington. Wife is a mountaineer. Four daughters.

THE HOGGAR AND ITS MOUNTAINS

By Alain Barbezat

For those who come from Algeria, to cross into Touareg country by way of Mouydir is always surprising. After the sands and bare plateaus of the Arab country, there are mountains at last to gladden the climber, valleys where trees grow, rocks, mysterious summits which show up from afar off. These are in fact the landscapes that one finds throughout the Hoggar.

Actually, the name Hoggar¹ does not always designate the same region and it seems to us necessary first of all to define the exact meaning of the term. According to Father de Foucauld's dictionary, *Abaggar* designates the territory under the domination of the Kel-Ahaggar Touareg, one of the seven main groups which make up the Touareg people. In this sense the Hoggar is an entirely mountainous land contained between the Tassili n'Ajjer (Adjer) to the east, from which it is separated by the great Wadi Tafassasset, the Tidikelt to the north (beyond the Wadi Botha), the Ahnet and the Tanezrouft to the west, and the Tassili du Hoggar to the south. The administrative territory of the Hoggar, or the Hoggar Annexe (380,000 sq. km.), also includes the Ahnet and the desert regs of one part of the Tazenrouft and of the Tassili du Hoggar as far as the territory of Ain Sefra to the west and as far as the Niger and the Sudan to the south. The Kel-Ahaggar territory is divided into 21 natural regions, each of which has a name. The highest region, a kind of citadel in the heart of the land, forms the Hoggar in the strict sense, but it is generally designated by the name Atakor or Koudia.² The Koudia is an oval-shaped massif with an altitude varying between 6500 and 10,000 ft., contained between 23° and 25° 30' latitude north, and between 5° 10' and 6° longitude east (about 25 × 50 miles). The Koudia is bounded everywhere by the Aneggir region, which entirely surrounds it like a closed ring and represents the slopes of the massif that incline gently towards the neighbouring plains.

There are no chains of alpine type in the Hoggar region. But there are many small massifs and many isolated mountains. It is a chaotic world with a confused relief, with ravined summits, bare plateaus, rocky domes, strange volcanic peaks, deep gorges, and wide wadis of pale sand.

¹ *Hoggar* is an Arab distortion of the term *Abaggar* used by the Touareg.

² *Koudia*, Arsi term = *Atakor*, Tamacheq term, signifying summit.

The whole of this land is calcined by the eternal Saharan sun. The dryness of the air, too, is always extreme, and almost painful for a European. Nevertheless, the desert climate here is greatly modified by altitude and the temperature definitely lowered. The dryness, the contrasts of temperature, and the very great luminosity are almost the conditions of high altitude. The water provided by the very rare rains collects at the bottom of the mountain valleys and its presence makes the charm—unique in the Sahara—of many of the valleys in this country.

But one of the great attractions of the Hoggar is doubtless its inhabitants: the famous Touareg. Protected by the mountains, the Touareg have kept their language and customs, and today still form a civilisation full of interest, the most original in the whole Sahara. Badly equipped against the cold, they are not a mountain people and they are grouped in the valleys. The summits do not interest them, except in hunting moufflon, and many even of the easy mountains were never climbed before the arrival of the French.

Scattered through the Hoggar in the most humid places are a few centres of cultivation, or arremes, where sedentary negroes live very poorly. Tamanrasset (4600 ft.), the only large populated place in the Hoggar and the chief place of the Annexe, is situated at the southern edge of the mountains. Once a simple arrem, since the French occupation it has become a small town (with 1900 inhabitants, 75 of them European) of houses of baked earth, shaded by many tamarisks and poplars.

What most strikes a new arrival in these mountains is the aridity, the often total absence of vegetation. One might call them dead mountains. They change colour with the hours of the day and in some sunsets assume very bright shades. But in general they have a dull ochre tone, very uniform, almost metallic, which further strengthens their austere character and the impression of desolation. The Hoggar is not as colourful a land as it is sometimes said to be. There is the same spoliation as in the high mountain; but rather than an impression of altitude, it is that of a far horizon, of an infinite immensity, which these mountains give and which no cloud conceals. The greatest beauties of the Hoggar are perhaps its light and its skies, of which our European heavens seem only a pale reflection.

In the Hoggar are numerous and often very lofty granite massifs that can enchant even real mountaineers. But the alpine interest of the massif is above all in the presence of volcanic summits which are generally abrupt spikes.

These volcanic formations seem at first so strange that one cannot refrain from asking how they were created. Their exact geological study began only a few years ago; but it has provided us already with a quite new explanation of the volcanic past of the Hoggar. According to the geologist P. Bordet¹, the Koudia,

¹ P. Bordet: *The recent volcanic apparatus of the Ahaggar*. Regional monograph of the XIX. International Geological Congress. (Fac. Sciences, Alger, 1956.)

a vast cupola of precambrian rocks, was at first covered with an immense carapace of basalt outflow. At a later epoch a basaltic volcanism occurred, this time localised, and simultaneously the spikes or domes that one sees haphazardly scattered, and which are of acidic lava (trachyte and phonolite) erupted. "Three hundred of them thus existed in the central part of the Atakor alone (10×25 miles), but they were even more numerous outside this perimeter. . . These peaks are not the remains of large and deeply worn volcanoes; on the contrary, each of them forms an extrusive construction, autonomous and complete." And this is how one of these summits might have been formed: "The eruption that gave birth to the peak started abruptly by some ten explosions which opened a circular shaft through the crystalline formations of the pedestal and the basalts. The debris was thrown out over several kilometers and formed a flattened cone. Through the orifice there then emerged a spike of consolidated lava which was able to rise to a certain height and appears not to have been either broken or sunken on the spot. . . The raising of the Montagne Pelée, so faithfully described by A. Lacroix (1904) is the best known example of an eruption of this kind. . . And the morphology of these acidic erections cannot have changed much since their eruption." Later, further basaltic eruptions appeared at various points. This last phase was quite recent and it is known that in the Tibesti volcanic activity has not entirely ceased.

These volcanic summits are never more than 1000 ft. above the debris, so that climbs in the Hoggar are generally short. Some are difficult and some are magnificent. Meanwhile their limited extent is likely to disappoint one who is exclusively a climber, who will find better in the Alps. But all of this is compensated by the character of these mountains, which is doubtless unique in the world, and by their remoteness. For here the climb is not everything and the approach march raises problems no less serious. However, the summits that are high, steep and isolated enough to interest a climber are not so numerous as are sometimes said.

Personally I have never encountered rock like it: it is smooth lava, at times covered with the patina of desert rock, sometimes flaking at the surface, and of a structure often very strange. Sometimes the rock is excellent, but in general it is not very good and requires much care. As to firm holds, they are always rounded and not very distinct. In this volcanic rock, like a solidified paste, good cracks for pitons are rare, choked or not very secure, all of which often limits the possibilities of ascent. The atmosphere of a climb in this stony decor, where a complete silence reigns, has often something sensational about it, and the vertical nature and spacing of the summits always gives a strong impression of airy isolation.

It seems that for some years the Hoggar, once a land of mystery, has lost its prestige with the coming of tourism. The heroic age is, however, not far off,

when to reach the Hoggar was still an expedition. The first automobile reached Tamanrasset in 1920 and a regular car service was established only in 1933. The beginning of Saharan climbing in 1935 was still somewhat of that age. Then, recently, a regular air service was created, so that today Tamanrasset is no more than six hours' flight from Algiers. There is now, from November till April, a small tourist flow to the Hoggar, but the tourists do not move very far from Tamanrasset. The majority go up to the neighbourhood of the Assekrem, attracted by the grandiose landscape of the Koudia and the memory of Father de Foucauld. The Assekrem is reachable in two days from Tamanrasset by camel, and in a few hours by car, for a motor road—what a pity!—has been constructed as far as the Assekrem: to the east by way of the Akar-Akar, to the west by the village of Ilamane. The classic circuit organised by the travel agencies consists in going by car to the village of Ilamane, then for a two or three day *meharie* through the Ilamane, Assekrem and Akar-Akar, whence a car takes one back to Tamanrasset.

The volcanic region of the Assekrem, the highest in the Koudia and in the whole Hoggar, offers in a reduced area a great number of splendid summits, some of the finest in the Hoggar. Being so close to Tamanrasset, it was the first to be explored by climbers. It appears even that its last important summits were climbed by the Martin-Pierre-Syda expedition in 1950. Today only faces and spurs still remain to be conquered, some of which perhaps constitute fine ascents.

But this region apart, who can say that the Hoggar is a land too well-known? If one goes away from Tamanrasset and the Assekrem circuit, one still finds the mysterious Hoggar where one can march for weeks without meeting a European. Certainly, the greater part of the Hoggar is mapped on a scale of 1:200,000. But the relief is so complex that many even noteworthy summits are not shown and most often left unnamed.

It is therefore difficult to indicate the most interesting regions to explore. Following Coche¹, we will however mention several fine massifs. The wild Serkout, whose summits are easy by the normal routes, but with a fine south-east face and very interesting volcanic surroundings. The far-off Telerhtebe, twelve days from Tamanrasset, an advanced sentinel of the Hoggar above the Amador Plain, was climbed for the first time by the geologist Kilian in 1922. In the Tefedest: the Garet-el-Djenoun (ten days from Tamanrasset), first climbed by the Coche expedition in 1935, and the Iscaouen-Toukoulmout (three days north-east of In Eker). Finally the Tahalra, south-west of Tamanrasset, a volcanic massif analogous to that of the Koudia, but much smaller.

These regions are further afield; time is needed in order to reach them and one must not be afraid of long monotonous marches in which Saharism is at times more important than mountaineering and set-backs are to be expected.

¹ *Le Montagne*, No. 874 (1955), pp. 374-422.

Finally, outside the Hoggar, there are the other Saharan massifs, much more difficult of access: the Air, where no climber has gone; the Tibesti, explored from the climbing angle by the Swiss expedition of 1948¹, and in 1953 by the Frenchmen G. Cavot and P. Brossette². As to the Tassili n'Ajjer³, today reachable by regular plane from Fort Polignac (via Fort Flatters), it does not seem to offer well individualised objectives—apart, doubtless, from the Adrar of Tassili.

In the Hoggar, on the contrary, if one chooses Tamanrasset as starting point, the organisation of an expedition is quite simple, although it may not always be easy to procure camels.

The finest way of reaching the Hoggar is to go by road. The Transsaharan Road passes through Laghouat, Ghardaia, El Goléa and In Salah. The small cars of the S.A.T.T. from Algiers to Fort Lamy took one to Tamanrasset in six days during the winter season. They were withdrawn in 1953, but one can still hire the supply trucks of this company. In November 1952 Air France founded a weekly air service from Algiers to Tamanrasset; the service operates even in summer, but at longer intervals. Moreover, the majority of passengers disembark at In Salah, where recent petroleum prospecting has involved a quite considerable traffic.

Once at Tamanrasset one can still take advantage of a car to approach some massifs. A motor road is under construction which will reach Tazrouk by Tidjamayène, the Issakarassène gueltas, the Imathra gueltas, Hirafock and Idelès. But one cannot really travel to the Hoggar without having recourse to camels. Thanks to them, the problem of portage is solved, each beast being able to carry at least 150–200 kg. But it will always be desirable—especially if going far—to be as light as possible.

Today it is possible to find all provisions at Tamanrasset. It will still be necessary to provide the food for the Touareg guides, even if in principle they ought to arrange their own provisions. Wood is found almost everywhere and stoves are not necessary. On the other hand in winter the cold can be intense and a tent seems to us to be indispensable. In the mountains themselves, the sources of water—tilmas, and less frequently gueltas⁴—are numerous, except in periods of great drought.

The winter season from November to April is clearly preferable and the Touareg themselves avoid big journeys during the summer. However, a *méharée* in the mountains is not impossible even in full summer by suspending marches and avoiding ascents during the hottest hours.

¹ *Berg der Welt*, IV (1949), pp. 96–158.

² *Revue Alpine*, No. 178 (1953), pp. 22–41.

³ Tassili (tam.) = sandy plateau, without outstanding summit.

⁴ Tilmas (ar.) = *Athar* (tam.) = trough dug in the alluvium of a wadi for obtaining water.

Guelta (ar.) = *Aguelmat* (tam.) = permanent pool.

In not too difficult country, stages of 20 miles or more are made in a day with normally laden camels. It is hardly possible to leave the tracks or the march at once becomes very difficult for the camels; on the other hand, the tracks are very numerous. One can only have confidence in the Touareg guides, some of whom have a most extraordinary knowledge of the desert. Quite often, on important stretches, Touaregs are met from whom one can ask for information about the route. One should be provided with presents for them in kind: green tea and sugar, of which there is never enough. One will certainly have an opportunity to savour Touareg hospitality in a passing encampment and sometimes to experience the astonishing courtesy of the nomad aristocracy.

There are many other things that one is astonished to discover in this apparently monotonous and lifeless country. The Saharan expert finds there an infinite number of subjects for study.¹ Without being a Saharan, the climber, while discovering faraway summits, will also experience the charm of long *méharées*. And on his return he will not be able to forget these mountains from another world, so worn and so luminous, and the impression of perfect freedom he has known during those days.

Hoggar, 1952-1955

Bernard Pierre's book *Escalades au Hoggar* (1952) gives a complete history of climbing in the Hoggar² and describes in detail all the climbs made up to that date. Here we will continue the story for the last three years, that is to say since the Martin-Pierre-Syda expedition of 1950-51. (The account of our own two journeys is given in part at the end of these pages.)

During the winter of 1952-53, the Hoggar received three mountaineering visits, according to our information. In December 1952, at the same time as ourselves, there was first of all an English party composed of George Fraser, Geoffrey Sutton and Edward Wrangham. Very good climbers, in fifteen days they accomplished several fine ascents in the region situated east of the Tidjamayène, as well as in the vicinity of Tamanrasset. On December 21st they made the third ascent of Adaouda by the Martin-Pierre-Syda route; and on the 22nd the Aounahamt by the south face, a small summit situated north-east of the Adaouda, which might perhaps be the "Aunahan" ascended by Beyschlag and Ellner. On the 26th they made the first ascent of the Adade (= "finger" in Tamacheq), a remarkable needle about 650 ft. high, which they climbed by the north face; it is

¹ In 1957 the University of Algiers founded an "Institut for Saharan Research" which centralises the scientific studies of the Sahara and periodically publishes a miscellany of *Travaux*. A very complete bibliography of the Sahara will be found in the book by R. Capot-Rey: *Le Sahara Français*, 1955. On the Hoggar in particular, see Claude Blangero's *Le Vrai Vieux du Hoggar*, 1955.

² An error of detail is to be observed: Wym-Dunant only went there in 1917 after Beyschlag and Ellner; the first ascent of the Teboulag Sud therefore belongs to the latter.

a quite difficult climb, made tricky by bad rock. On the 27th they were at the Aharon, which Sutton climbed alone by the south-east face, while his companions made use of the western ridge. On the 28th they climbed the north summit of the Ibaharen by the south face. On January 2nd they climbed the Iharen by the normal route on the south face, and finally, on the 5th, the Issekrar by the south pillar (2nd ascent), which they found comparable in difficulty to the Iharen. These last two ascents were made on foot from Tamanrasset after the caravan's camels had fled.

In March 1953 the region of the Assekrem was visited by a group of six Lyonnais: A. Bailly, R. Bérard, M. Coste, L. Dubost, P. Gendre, M. Malpelat.¹ Arriving by plane, they effected in only a week a series of ascents for the most part new, especially on the Aouknet and in the Taridalène (Taridalt) group. First they climbed the Ilamane on March 21st in two ropes. While their comrades went up by the normal route, Dubost and Gendre made a very forceful attempt in the impressive south face; but the innumerable pillars of prismatic lava, undercut and forming overhangs in the face, forced them back; by a wide traverse to the left they then succeeded in rejoining the normal route on the north ridge, by which they reached the summit. On the 22nd the complete party opened two new routes on the Aouknet: the north-east and south-west ridges. Dubost and Gendre for the first time climbed the fine south face of the culminating point (the group's point D). It is a very difficult climb, vertical and kept going by several artificial stretches. The still virgin westernmost point was climbed in passing by Gendre from the gap below the culminating point. The same day the rest of the party carried out the traverse of the Taridalène from east to west (2nd ascent). On the 24th the In Borian (or In Bouri) was climbed by the west ridge and by the north ridge. Finally, on the same day, the Taroutine, situated some distance east of the Taridalène, was climbed by its difficult west face (1st ascent).

During the winter 1953-54 the only mountaineering expedition was that of Claude Aulard of Paris (today a mining engineer at Algiers) and Marc Vaucher of Algiers. On January 1st they made the ascent of the Iharen by the normal route, and on the 4th the Ilamane by its east face, following the same route as we had done a year earlier; on the 6th the Saouinane by the south face. Finally, on the 7th they made the first ascent of the west face of the Hadriane, a fine climb of 650 ft., difficult and sustained; it was the fourth route to be opened on this summit, and the most difficult.

The winter of 1954-55 has seen up to date four expeditions, all outside the Koudia, which is beginning to be well known. The wild Wadi Tandjète alone has received three visits!

First of all, in November, there came the three Swiss: Robert Grévoz, Francis Marullaz and Jean Weigle. Setting out with the idea of doing little climbing and

¹ *Revue Alpine*, No. 576 (1953), pp. 57-67.

more exploration, they brought only very reduced alpine equipment. But at Tamanrasset, Mr. Blanguernon spoke to them of the peaks of the Wadi Tandjète and they decided to follow his recommendations. So they arrived at the foot of the Immerous on November 10th. Marullaz and Weigle made an attempt by the north-west face, but with their meagre equipment had quickly to give up. The next day all three tried the Ouessouk, a remarkable peak situated three hours north of the Immerous; they ascended by a chimney in the south face but had once more to give up before great difficulties. They then pursued their exploration by ascending the Wadi Tehagarte, tributary of the Wadi Tandjète. Here there is a group of peaks that the people call Iferan-ouin-Tehagarte (*iferan*, plural of *eferi* = rock needle). So they climbed three peaks, one of which, situated at the extremity of the wadi, offers a very fine ascent by its north ridge. On the 14th they made the second ascent of the Ibarahen. On the 15th, the western points of the Tardalène were climbed by the south face and the eastern points by a chimney which ends at the gap east of the highest point. On the 18th, the Iharen. Finally, on the 20th, the Hadriane by the south-western cliff.

In December we made a brief reconnaissance of the Wadi Tandjète, of which we will give an account later. We were shortly followed by the Belgian expedition composed of Albert Plaetsier (leader), Louis Coupez, Roland Doornaert, Jean Duchesne and André Focquet. On their arrival on December 24th, three of them—Coupez, Duchesne and Focquet—made from Tamanrasset the second ascent of the Hadriane by its west face, following to a considerable extent the Aulard Vaucher route. Then, the next day, the expedition left Tamanrasset bound for the Wadi Tandjète. On the 29th, Duchesne and Focquet made an attempt on the north-west face of the Immerous, but they were soon stopped by the impossibility of fixing pitons. The next day they attacked the south face, 500 ft. high, which they succeeded in climbing in thirteen difficult hours. But they had to bivouac at the first third of the wall; the summit was reached on the 31st at 4 p.m. It is an extremely difficult route, almost entirely artificial, with great difficulty in pitonage, requiring numerous pitons and wood wedges. After this magnificent exploit, the caravan reached Tazrouk and explored the region north-east of that village. On January 5th, 1955, they easily climbed the In Tifar by the south face. On the 6th, the In Tin Aho by the east face, a difficult summit one hour east of the In Tifar. Then on the 7th, the Eferi Noubala, very close to the In Tin Aho, by the east face of the southern point, a serious climb but not very prolonged. Finally, the next day, the south face and the difficult east face of a peak north of the In Tifar: the Efta Tebarakan. On the return, they climbed again in the Wadi Tandjète a fine but not very difficult summit, the Djadoul, at the northern end of the wadi.

The last expedition was that of Claude Aulard and Jacques Bertraneu, both mining engineers in Algeria. After having climbed the Iharen (9th ascent) on

January 9th, 1955, these climbers went to the Garet-el-Djenoun (or Oudan, 8635 ft.), where they arrived on January 18th. A long approach march from the north brought them to the foot of the mountain, which they climbed by the wide couloir on the north face (1st ascent). It is a difficult ascent even though not sustained and they had to bivouac on the descent. The summit did not seem to have been visited since 1938 (Coche and Frison-Roche).

Jaquet-Rouget Expedition, July-August 1938

A great prestige surrounds the personality of Raymond Jaquet. His solitary exploits in the middle of the Sahara and his heroic death have still something mysterious about them and we have only a few details. That is why we have here gathered together some information about his journey based upon the notes of his companion, Jean Rouget.

On July 14th, 1938, Raymond Jaquet and Jean Rouget left France for Algiers with the intention of carrying out a great transsaharan journey. It was an old plan of adventure for these two students of 22 years, who had just ended their second year at the Ecole de la France d'Outre-Mer in Paris. The previous summer, Jaquet in Morocco, and Rouget in Tunisia, had gone southward and had acquired an enthusiastic first experience of the desert. This year it was to be a question of reaching Dakar across the Sahara and the Sudan, via Tamanrasset, Gao and Timbuctoo. In short, neither of them dreamed of Saharan mountains; it was almost a matter of luck that brought Jaquet to the Hoggar which was to keep him for ever.

Actually, an unpleasant surprise awaited them at Algiers: authority to enter French West Africa was refused them by the authorities who considered the passage from Taneczrouft in summer to be too hazardous an enterprise for "a small private expedition". But in compensation and by unexpected luck, the Commandant of the Office for the southern territories gave them his support if they consented to limit their ambitions to a circuit of the Hoggar. He then got for them a subvention from the Gouvernement Général of 2000 francs and authorised them to use at half-tariff the truck which provisioned Tamanrasset every month. The idea at once occurred to Jaquet of turning their trip into a climbing affair, even though his companion had never yet made an ascent. The stop at Algiers was used in seeking vainly for mountaineering equipment; but apart from a few pitons they had to be content with haphazard equipment: marine ropes and a small tool used for breaking sugarloaves instead of climbing rope and hammer.

So they started southwards at last along the great Transsaharan Road through Ghardaia, El Goléa and In Salah, and were everywhere charmingly received by the men in charge of the posts, who had been mistakenly warned of the passing of a "mission entrusted with studies in the Hoggar"!

Purchases at Tamanrasset (blankets, guerbas, gandourahs, sarrouels¹, etc.) exhausted their last finances. Little remained for provisions: a sack of flour, 12 tins of milk, 6 tins of pineapple, was all they could take. At last, early in August, Jaquet and his companion left Tamanrasset, accompanied by a guide and a camel-driver. First the caravan reached Fort Motylinski, then, marching north-eastwards, arrived at the foot of the Aokassit. On August 15th they carried out the first ascent of the Aokassit (7084 ft.) by the south face. Jaquet climbed very quickly and with great ease. The ascent seemed to him easy and they were on the summit in 1½ hours. But on the descent Rouget, whose first climb this was, came out of a rappel; by incredible luck he escaped almost without injury. Not a serious accident, but one that was full of significance for the future. In fact, Jaquet reckoned that henceforth it would be better that his companion should stand down when serious ascents were involved. He also thought that the success of ascents in the Hoggar depends essentially on the speed with which they are carried out, the rock becoming almost impracticable under the effects of the heat, at least at that time of the year.

From the Aokassit they returned to Tazrouk, then Idèles and finally the Ilamane (9050 ft.), where they arrived about August 20th. Jaquet left at the end of the afternoon to reconnoitre the way. He returned after having climbed to the summit. This was the fourth ascent of the Ilamane. His success was the more remarkable since from then on both were attacked by dysentery, while the inadequacy of provisions was making itself felt.

Ignoring the too easy Tahat, the two friends reached the Assekrem, where Father de Foucauld's hermitage gave them shelter for several days. From there, while Rouget hunted moufflon, Jaquet attacked two neighbouring peaks. He made the second ascent of the Saouinane (or Séouénane, about 8530 ft.). He attempted the Téhoulag Nord, which was still virgin, but had to turn back after two attacks. Then about August 27th, still alone, he made the first ascent of the Adaouda (*ca.* 6034 ft.), since named Pic Jaquet, a remarkable spike situated a short stage from Tamanrasset, which had already been attacked twice—in August 1937 by E. Beyschlag and H. Ellner, and in November 1937 by R. de Bournet and A. de Chatellus. The ascent of the Adaouda was not to be repeated until 1950 by the Martin-Pierre-Syde party; these climbers made use of the west versant, following a route they reckoned too difficult for a solitary climber. According to them, Jaquet must have ascended by the south-east face. His cairn was still on the summit.

Finally, before returning, Jaquet and his companion turned towards the Iharen (or Pic Laperrine, 5847 ft.) which had only been climbed twice. What happened at the Iharen? No one will ever know. "It had been decided", wrote

¹ Guerbas, bottles made of a whole gourd; *gandourahs*, voluminous cloth robes; *sarrouels*, wide trousers tightened at waist and ankle.

Rouget, "that for the last ascent I would be one of the festive party. Furthermore, Raymond regarded this ascent as very easy, and on the morning of August 31st he left in a sarrouel to make the preliminary reconnaissance. He had not returned by ten o'clock. I went to meet him and for more than two hours scrutinised the wall. I had to go to the foot of the rock to find him among the scree, his limbs broken, dead. Doubtless a hold had given way..."

In despair, Rouget returned to Tamanrasset at once and roused Colonel Florimond. The Wadi Tamanrasset was that very day in flood, an exceptional occurrence which made the transport of the body, by men of the army, very difficult.

Jaquet still lies today in the cemetery at Tamanrasset. His rope was left in the wall, far to the left of the normal route of ascent. It could be seen very well from below until in January 1951 it was collected by M. Martin, on the third ascent of the Iharen, and deposited at Tamanrasset.

This is what Rouget adds concerning his friend: "Raymond Jaquet was born on July 24th, 1916, at Basle, of an Alsatian father and a mother of Swiss extraction. Very methodical of mind; more than wilful, even stubborn. Able to impose the strictest discipline on himself. These qualities very quickly proved their worth in numerous university successes; in 1936, besides his success at the Ecole Coloniale, he had already obtained his various certificates for a doctorate of law. Physically, he was 5 ft. 11 in. tall, very attractive, and an excellent sportsman. In 1936, I believe, he was fencing champion of the French universities. His other favourite sports were swimming, canoeing, skiing—at which he excelled—and finally rock-climbing.

"Both in Switzerland and in the French alps he had done numerous climbs and in student circles interested in mountaineering he was classed among the best.

"Jaquet was an exceptional person. His distinction was recognised by all and his friends were unanimous in avowing that he was destined for a very brilliant career which the stupid accident on the Iharen dramatically destroyed..."

TWO ITINERARIES IN THE HOGGAR (Travel Notes)

The Aokassit and the Koudia, December 1952

Having arrived at Tamanrasset after seven days by car on the Transsaharan Road, we were at once welcomed, my wife and I, by M. Blanguernon. Quite a personality in the Sahara, M. Blanguernon and his wife run the school at Tamanrasset and several schools for nomads that he founded some years earlier. We were to owe much to their friendship. They had already reserved for us three

camels and saddles. Our guide was a young man of seventeen, Boubeker ag Brahim of the Kel-Rela tribe, a particularly noble tribe and the one from which the Amenkhol of the Touareg is appointed. Adopted by our friends, he had learned French remarkably well, which is very rare for a Targui. Now, for the first time, he was guiding travellers towards his mountains.

We set out on December 12th, in the afternoon. Our friends had called attention to two rock needles on our road, known to the Touareg as Ibarahen. They were situated a short distance east of the Assekrem and appeared to be still virgin. In two short days' march we reached the Afilale gueltas at the south-east edge of the Koudia, whence the Ibarahen could be seen. It is a slightly broken region of wide foothills and plateaus, where the gueltas form a splendid corner with small pools of deep and perfectly transparent water in the polished rocks, with oleanders, reeds and sometimes a flock of pigeons poised on the rocks. The Ibarahen rose up at one hour's march northward: two rock spikes of curious shape. The next day, without difficulty, we climbed the small north summit, where we found a cairn. A short distance away, the south summit, which is the culminating point, had much more style: it is a wide cylinder from 300 to 650 ft. high, on which perch numerous birds of prey. The ascent was made by a line of chimneys orientated westwards, which seemed to us to be the only possible route on this mountain, the greatest difficulty being the fine commencing wall about 100 ft. high. We found no trace of earlier ascent.

Still marching eastwards, the next day we crossed a slightly broken high region stretching to the Tazrouk arrem, five days from Tamanrasset. There were few noteworthy summits, except for one curious basalt point fixed to the flanks of the great In Tairine plateaus: the Adade, which was to be climbed for the first time a few days later. A little further off, as we spent the afternoon at the foot of a large pyramid called Aharou by the Touareg (Issou on the map), we still had a little time to go and see it. We ascended the west versant by a vertical spur formed of enormous polished blocks, which seemed dangerously balanced, at the edge of a wall made of immense columns of lava with a crackled surface. It is a magnificent viewpoint, which seemed not to have been scaled before, and one of the last great isolated summits east of the Koudia. Further east and south the relief subsides; the view embraces an immense stretch of extraordinary wildness.

From this point we wanted to explore the Wadi Tandjète, where our attention had been drawn to a very fine virgin peak (the Immerous). Misled by the names given on the map, we got ourselves involved to the south in a labyrinth of tortuous ravines (Wadi Issedjène), without tracks, where at times the camels made difficult progress. We got out of it at last in the evening: passing through a col to the east, a great number of rocky spikes appeared before us at the end of a wild valley, which was none other than the Wadi Tandjète. There we were to

discover not one needle only but several, some of which looked fine. But we had no time to stop and had to continue on our way without being able to discover the Immerous.

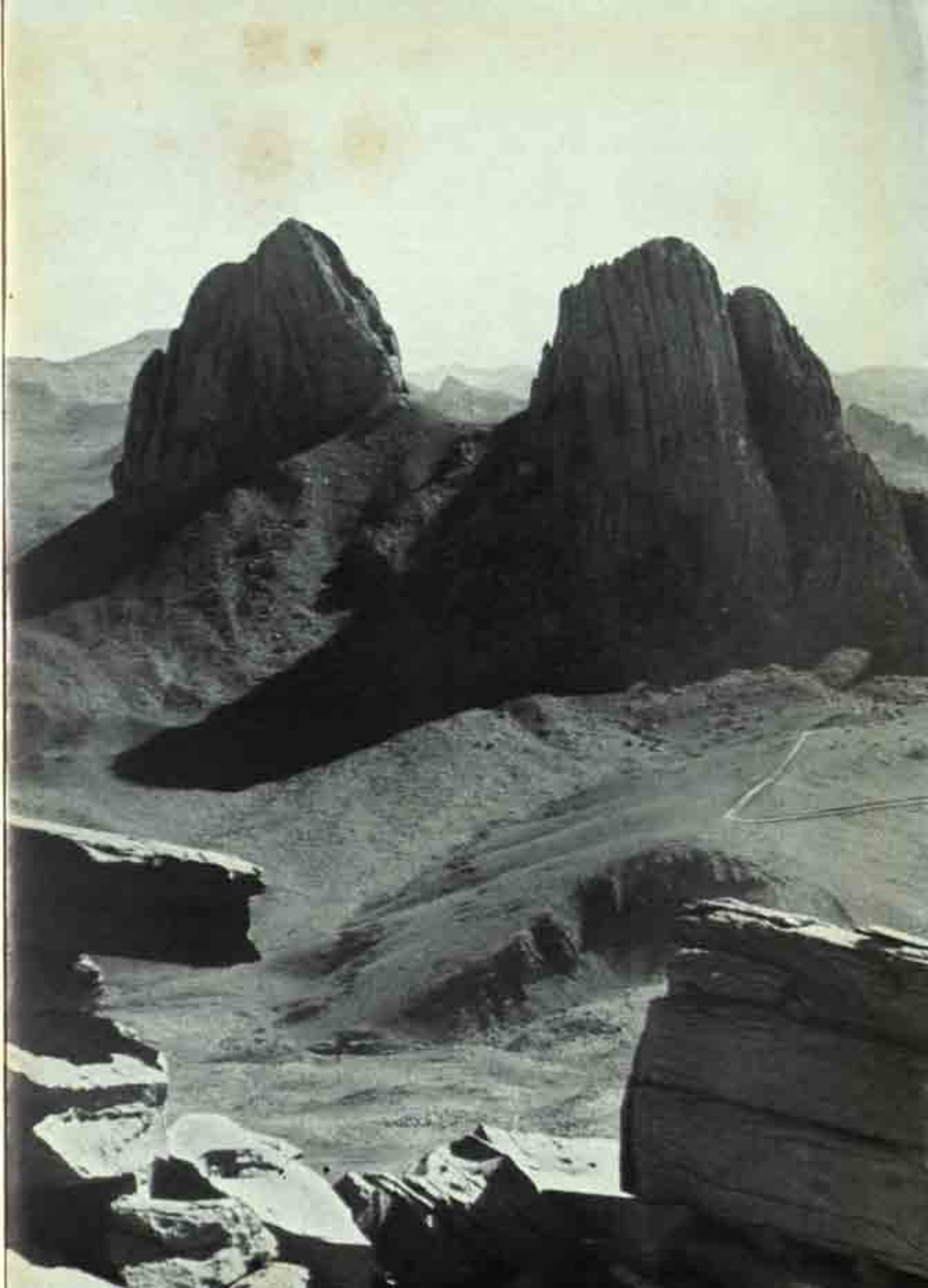
Having rejoined the old and now abandoned motor track from Tamanrasset to Tazrouk through the Col d'Azron, we arrived at the Tazrouk arrem (6050 ft.) on December 18th. The next day, in one small stage eastwards, we reached the foot of a magnificent rock needle: the Aokassit (7084 ft.). We had already seen its point rising above the surrounding plateaus from a great distance. It is one of the finest mountains we have seen in the Hoggar. The Touareg knew it well and did not think it had yet been climbed. We rose by a line of cracks in the south face (which perhaps constitutes the only possible route). The ascent was short (500 to 650 ft.), vertical, and with one difficult and exposed pitch. A little above this we were surprised to find an old rappel piton. There, under an enormous wedged block, we reached the gap that cuts the summit, which the people of Tazrouk told us was the result of a Tabouka blow received one day in a fight with another mountain. Above this was another slab and, by an easy couloir in the north face, we arrived at the summit. We were greatly astonished to find there a cairn with the card of the first to ascend it, Raymond Jaquet and Jean Rouget, with the date August 15th, 1938. From this high point the whole region was under our eyes, lost in absolute isolation, and this vision made us regret that we were not able to spare more time. We noticed isolated, rocky spikes here and there; a little distance east was a remarkable summit with an extraordinarily jagged profile; beyond, at about two stages distance, rose some great hills—the Serkout massif.

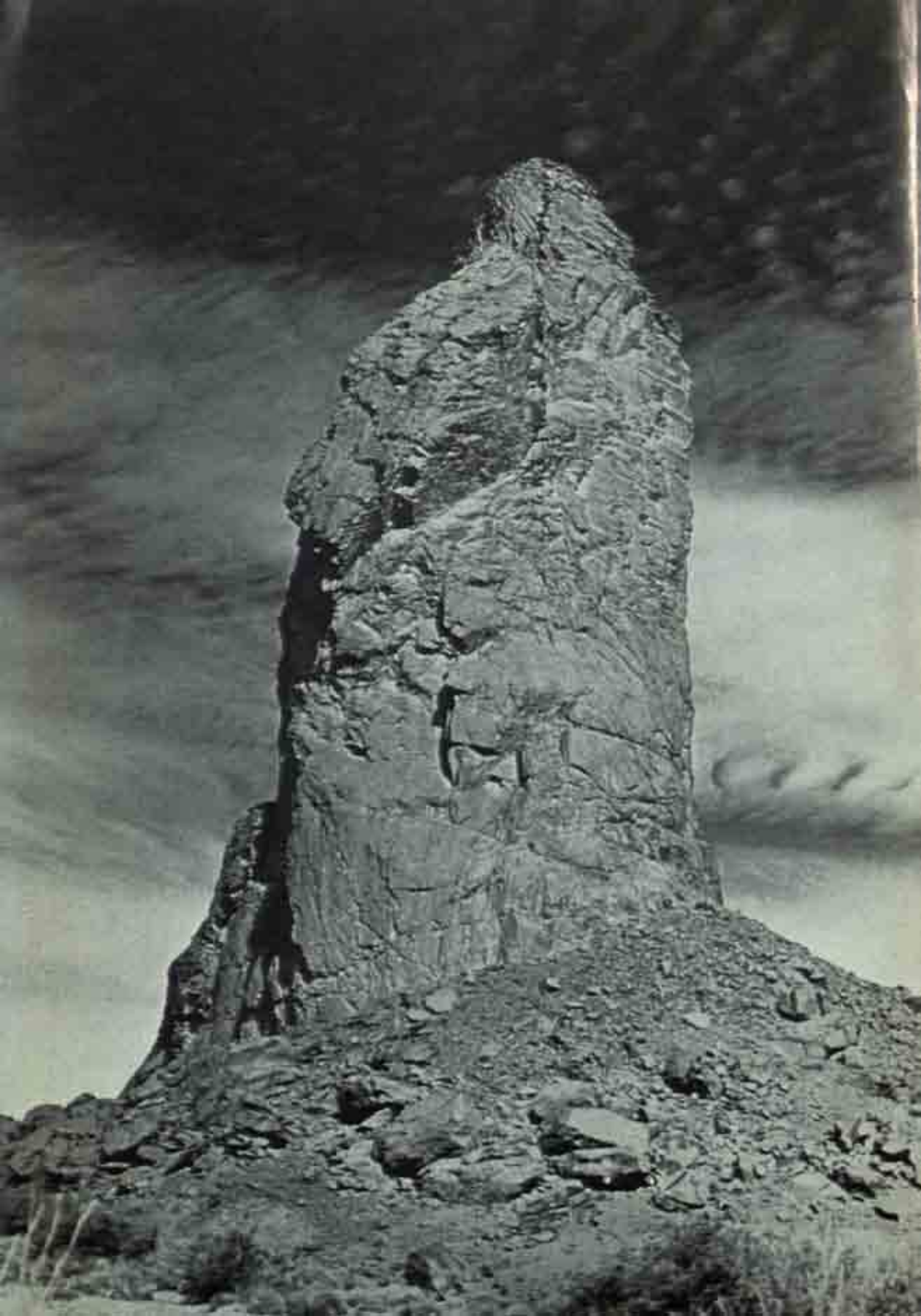
The next day we took the road back. Passing Tazrouk again, we had to buy flour and a kid to make up our provisions. Passing further north we crossed some bare plateaus with unexpected valleys: the Wadi Ramesse and the Issakarassène gueltas—valleys of the Touareg country, of which Conrad Killian writes with wonderment, "hiding at the bottom of fantastic gorges thickets of oleanders and mimosas, and little lakes. . ."

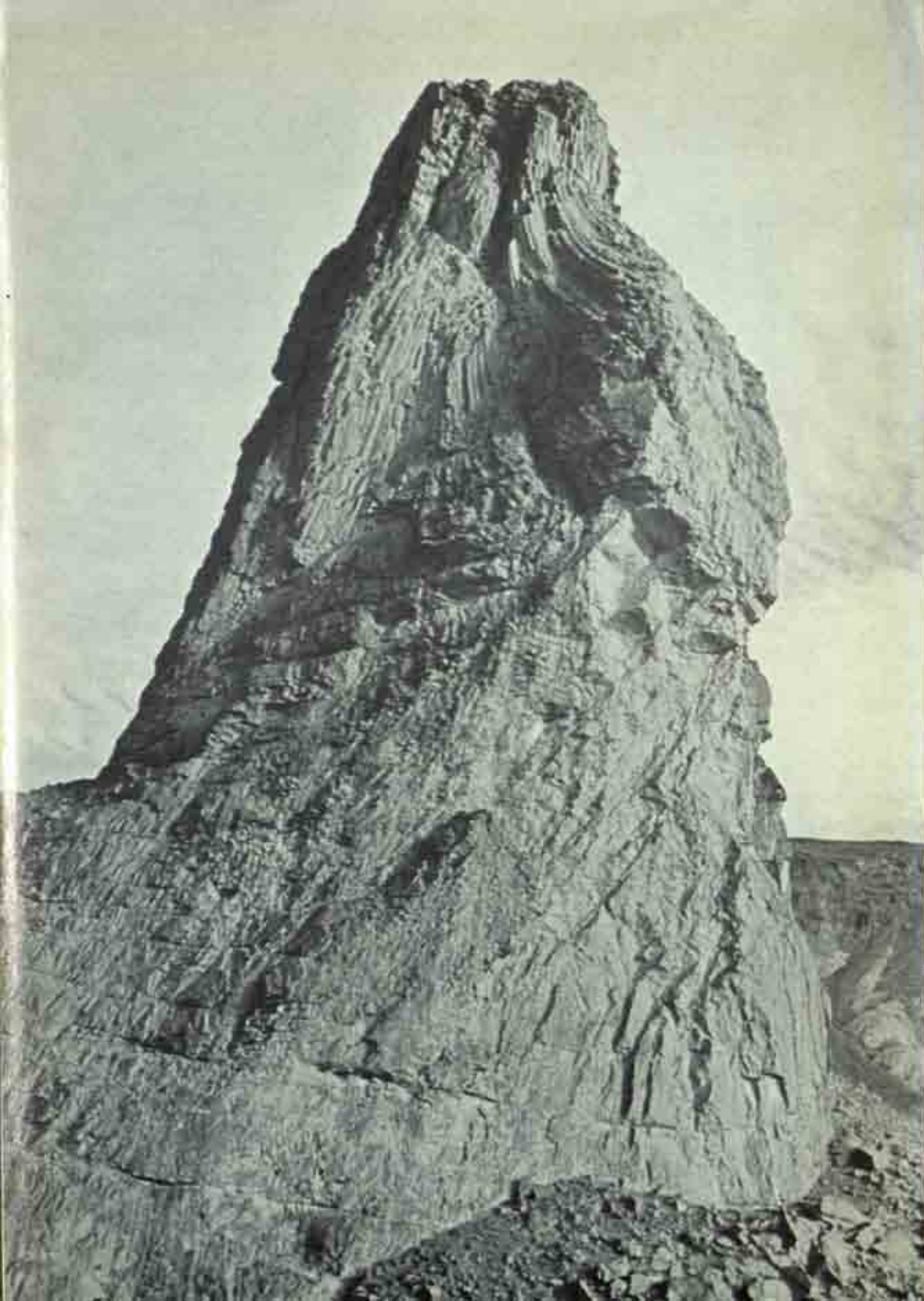
One afternoon, passing through the Col de Tché-n-Taratimte, we reentered the high land of the Koudia. At the foot of the Tidjamayène we camped beside a camp of workers engaged in constructing the future Tazrouk track, and it seemed to us to have become a civilized land. We had nothing to do but follow a good motor track, luckily always deserted, where we met only herds of goats, some Touareg and on a single occasion a tourist caravan. The track passed the

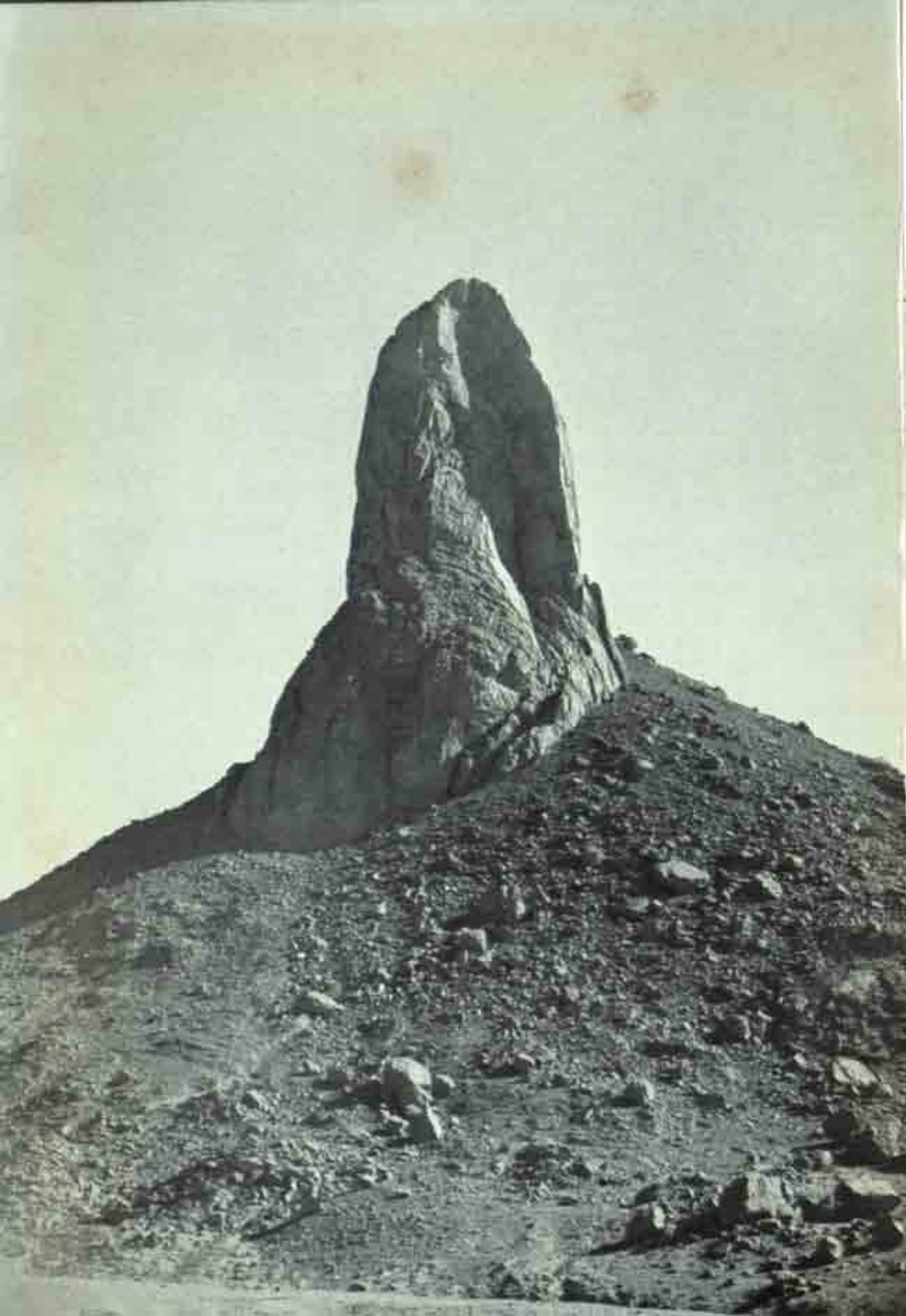
Plate 61: View of the Tidjamayène Massif: North Tazroulag (to the left) and South Tazroulag, seen from the summit of Sanninane (c. 8530 ft.).

Plate 62: South face of Immerous (1970 ft.). The route ascends this 400-ft. face.









foot of the Saouinane (ca. 8530 ft.), a fine needle which we ascended by a brief and not difficult climb.

The next day, December 26th, we were at the Ilamane (9030 ft.). This great, majestic, impressive peak is the most famous in the whole Hoggar. It appears to be surpassed in height only by its neighbour, the Tahat (9574 ft.), a massive hill and so easy of access that the grazing camels often make its ascent. The perfect shape of its summit is particularly admirable: an absolutely regular cupola raised to a great height in the sky.

Leaving the normal route on the Ilamane at the wide grassy terrace of the north-east versant, we were soon involved in the zone of overhangs on the eastern spur; we thus arrived a little below an old rope ring that doubtless marked the Frison-Roche attempt of 1935. Further left, a chimney and then some slabs made it possible for us to pass and reach the upper zone where the slope diminished more and more towards the summit. The climb had seemed to us quite dangerous because of its exposure and nature of the rocks. As always, the atmosphere was magnificently limpid and sunlit, with a limitless but nameless view over plains of sand where black rocks resembled reefs in the sea: a purely mineral world, which seemed to bring the geological upheavals to life. Ignoring the normal route on the north ridge, we descended by the route of our ascent.

On the 30th we climbed the Iharen (5847 ft.). The last summit to the south, it is already in the Tamanrasset plain (4600 ft.), out of which its phonolite columns rise magnificently. We made the ascent among the columns on its southern face, with a yellow expanse at its feet, very African, and dotted here and there with dark patches of acacias. We retain especially the memory of a magnificent rappel along a wide dihedron, vertical and absolutely smooth. At the end we still had time to get the same evening to Tamanrasset, only two hours' away.

The Wadi Tadjète, December 1954

We were forced back by a desire to see the mountains of the Hoggar once more. With little available time, we confined ourselves to reconnoitring the Wadi Tadjète, the peaks of which we had glimpsed two years before. This time we arrived by plane. What a contrast, on our arrival, between the violent light of the Hoggar and the grey fog of three days earlier! At Tamanrasset, to our joy, we found the Blanguernons and our guide and companion, Boubeker. This year there was a drought; almost all the camels were in the Sudan in search of pasturage. We had to take food for the camels and an extra beast.

Plate 63: The north-west face of Immerous (5970 ft.) is still a hard nut to crack.

Plate 64: Aokassir (7085 ft.) seen from the west. The face is 800 ft. high.

Boubeker knew the region well, having already led the Swiss there that year, and we lost no time in reaching it. We left the Assekrem track at the Aunahaut in order to cross some wide plateaus to the east. They led us to the foot of a great granite massif: the Aheleheg, along which we moved northwards. Three days from the start we reached the Wadi Tandjète, its wide bed of sand bordered by tamarisk thickets. At an elbow in the wadi, the Immerous suddenly showed up: a formidable cylinder of rock, 500 ft. high, rising from the very bottom of the wadi. At the foot of the mountain was a Touareg encampment, the inhabitants of which came to see us. There was water in the wadi, vegetation and innumerable little black goats whose cries resounded against the wall of the mountain. All the faces of the Immerous are well defended and its appearance somewhat discouraged us. Nevertheless, the next day, December 23rd, we attacked the north-west face, which seemed to us the easiest. The rock (trachyte) was the colour of brick, extraordinarily compact and not very propitious for climbing. Everything was rounded off and smooth. We gave up after 100 ft., facing great slabs without cracks, which seemed to me impassable.

We at once broke camp in order to get to the Ouessouk, which we saw rising up a little further north. We ascended the valley of the Wadi Tandjète, where a rivulet of clear water wound for some kilometres amongst a quite rich vegetation of shrubs and various aquatic plants. The Touareg had been established for two years at several points in the wadi, clearing and cultivating small fields. Hardly anyone comes to this sequestered wadi: we saw there several children of seven to eight years who had never yet seen a European. The Ouessouk is a very regular needle, capped by a cone of debris. There we found the same structure as at the Immerous and did not persist to the summit, which must be very difficult. Other crags of queer shape could be seen a short distance to the east; a Garguia who had come to see us named them for us: a group of rounded shape was the Ejeriouan-Ahautela; two large slices of rock were the Ekneouen ("the twins"), and a jagged arc-shaped wall was the Tarara.

We made our way to the Tarara and reached it in an hour. On its north side this mountain forms a sort of arena around a very wild inner amphitheatre; the way into it is through a little gorge carved in the wall by a wadi. We found a spring there and several rock paintings, especially a splendid group of three giraffes. The Tarara actually comprises two summits separated by a gap that is easy of access. We made the ascent of the western summit, the lower of the two, by a series of very smooth worn slabs and an internal chimney.

On the return we went to look at the east and higher summit; we began to climb on the east-north-east face. At the end of two fine ropelengths we reached a zone of wide shelves, from which we had good hopes of continuing; but it was too late and we descended by rappel. The next day, December 24th, we were once

more at the Tarara. We continued above some terraces by a wall of slabs situated to the right of a wide impracticable chimney-gorge. The climb was aerial, magnificent on such very strange rock, that was so compact that it was almost impossible to place a piton. Higher up, we providentially found a tunnel which made it possible for us to by-pass a large overhang; then came a quite tricky wall and we emerged on the summit. It was one of the best ascents we had made in the Hoggar. Having descended in five rappels, we camped the same evening at the foot of the Tétékkeout, in order to visit afterwards the northern part of the Wadi Tandjète. The Tétékkeout is a group of small rock needles sited at the very edge of the wadi. Their name comes from the Tamacheq word *tétekkeout*, which means a deep natural hole, with a circular opening, in a vertical wall of rock. In fact there is, in the wall of one of these needles, a perfectly round hole giving access to a small cave; and the Touareg say that you have only to penetrate into this cave and you will succeed thereafter in marrying.

From there we went to reconnoitre a group of peaks situated a little further north, known as Ijeran-ouin-In Erfan. We climbed the culminating point (*ca.* 6200 ft.) by the northern side without difficulty. A short distance from the summit we observed a spike 300 ft. high, narrow and vertical on every face, the ascent of which would be a serious problem.

The next day we left the Wadi Tandjète; this time we took a very direct track and after two long days' march we were back at the Adaouada (*ca.* 6250 ft.). We climbed it on December 29th. After seeking vainly for a route in the south-east face, we took the Martin-Pierre-Syda route. The climb reminded us a great deal of the Iharen; but here the rock was much less firm and the ascent was also longer and more difficult. The descent was long and it was late when we returned to camp. However, we mounted our camels and took the road to Tamanrasset, six hours' away. Night soon fell. We marched for a long time in the silence of the Saharan night under a sky sifted with stars. Suddenly M. Blanguernon's Dodge came to meet us and our journey came to an end when the car carried us away at top speed towards Tamanrasset.

THE MOUNTAINS OF ETHIOPIA

By Douglas Bask

A map of the continent of Africa shows only one large area marked in the darker colours used to denote high altitudes over 8000 ft. Many mountaineers must have cast reflective glances on this beckoning patch in Ethiopia, but most rule it out of their plans, because it is far away and costly, and above all because the conditions of travel and the exact nature of the climbing are little known. It may therefore be of interest to mountaineers and to those who like exploring mountain country, even if in the process they do not grapple up steep rocks or explore glaciers, to set out in Baedeker form the possibilities that exist.

First of all, however, it is desirable to know the conditions of travel, which, outside a few main centres, can best be described as rugged. You can arrive in Addis Ababa or Asmara in extreme comfort by air, but you must have made arrangements for your comparatively weighty kit to arrive at the same time by sea and train or truck. Previously you will have had to obtain visas and additional permits to travel in whatever part of the country you have selected. Much time should be allowed for this and early contact made with the representative of your country, diplomatic or consular, at Addis Ababa, who will advise on procedure. This is not because visitors are not welcome, indeed they are, but in a country such as Ethiopia it is reasonable for the authorities to wish to know that the traveller can be trusted not to put his foot in it. Similar precautions are rightly required in the Northern Frontier Province of Kenya. There are few things more tiresome to a busy official of any nationality than having to turn out at some unreasonable hour and despatch water, food or babies' milk (this has occurred) to an incompetent party in a dilapidated vehicle, which has then to be towed to the nearest mechanic. The authorities will also wish to be assured by someone they know that the members of the party are "respectable", i. e. tactful, used to foreign travel, not desirous of preaching their own religious or political opinions at every halt and so forth — in fact serious travellers and not merely tourists. The latter are entirely acceptable on the few routes where hotels and other amenities exist — here I am only speaking of those who wish to leave the beaten track.

Travel itself must for the most part be by car and reliable vehicles, capable of facing all sorts of unexpected difficulties are essential. I have a preference for 4-wheel drive in such conditions, though on the main roads this is not a prerequisite. The long wheel base Landrover "pick-up" is about as good as anything for such work. I should also feel happier to have always two vehicles in case of mishap. (This is insisted on in the N.F.P. of Kenya.)

All this really means that you must bring your own vehicles for any extended piece of exploration. You can hire, of course, but the cost would be high and you could not be so confident of reliability. If your party includes a competent mechanic, you will not need to engage a driver, but it is advantageous to do so, because you are most unlikely to speak Amharic or any other of the twenty or thirty main languages (not merely dialects) of Ethiopia, and a driver could double as interpreter.

None of this should be taken as too discouraging. I know of one 1922 bull-nosed Morris, which recently was successfully driven from London to Gibraltar, along the north coast of Africa and through Egypt and the Sudan to Ethiopia. It reached Nairobi, after which I lost track of it. This car stuck to the main roads, but in the south these can present formidable obstacles.

Travel should be confined to the dry season, because in the rains it is always unpleasant and frequently impossible. The big rains strike southern Ethiopia in March and move slowly up to Addis Ababa, which they reach in June. By July they have covered the highlands and Eritrea. They cease at the end of September in the north and centre, but earlier in the south. A few weeks must elapse before the road and tracks dry out and the rivers return to normal.

Another point to be borne in mind is that many of the roads marked on the map are not motorable. In any case, of course, the roads merely approach the mountains, access to which can only be gained by using mules. These can be hired, but negotiations take time and it is advisable to enlist the help of local authorities. This is readily forthcoming if the traveller is armed, as he should be, with a letter of introduction from the Ministry of the Interior in Addis Ababa.

Apart from a few centres there are no hotels and it is preferable to camp. In many areas the local authorities will provide an escort, which can be useful. Except where otherwise mentioned below, security is not a cause for anxiety. The importation of fire arms is a complicated business. I have not thought it necessary to carry them on tour for personal defence, except, alas, in Kenya. A young English nurse of our acquaintance hitch-hiked without qualm or incident from Asmara to Addis Ababa and British Somaliland.

There are no glaciers or permanent snow in Ethiopia, though hail is frequent in some areas and sometimes lies for considerable periods. Ethiopian mountains are, however, exceedingly cold by night and precautions must be taken accord-

ingly. I have known a bottle of wine freeze in a tent at only 9000 ft. By day the sun is intensely hot.

As regards supplies, most tinned goods can be bought, rather expensively, at Addis Ababa and Asmara, but at very few other places. Fresh food acceptable to the European palate is often surprisingly difficult to obtain in remote districts. This applies particularly to bread.

No camp equipment can be hired. Tents must be provided for servants, owing to the intense cold. If mule travel is contemplated, all kit should obviously be packed in containers of suitable size and weight.

A word as regards mules. Years ago when I was inclined to fancy myself as a connoisseur of that much maligned animal, I could not believe that anything could be better than a good Persian mule. I am now less certain. The best Ethiopian mules are superb in appearance, temper and gait. You will of course be very lucky to hire the best, which are much prized by local chieftains and indeed preferred to horses. Remember that in Ethiopia you must mount horses or mules from the off side, as do the inhabitants. They will shy away from approaches on the near side. Local saddles are vilely uncomfortable. If you can, bring your own. Anyhow bring stirrups and leathers; the locals use none at all or a ring stirrup in which only the bare big toe is inserted. Of course no mule should be hired until you have had its saddle off and inspected its back. Any animal with a sore should be steadfastly refused.

The internal services of Ethiopian Air Lines (a subsidiary of T.W.A.) cover many remote places during the dry season. Of the towns mentioned in these notes the following can be reached by air: Asmara, Axum, Gondar, Dessie, Bahar Dar, Dangila, Debra Markos, Addis Ababa, Soddu and Goba.

Most travellers reach Ethiopia by air. Cars ~~can~~ be driven through Egypt and the Sudan, but parts of the route are exceedingly difficult and even dangerous owing to lack of water and any facilities. Cars can be shipped to Massawa and thence driven up to Asmara and southwards; or to Jibuti, whence they can be railed to Addis Ababa (parts of the track from Jibuti to Addis are so bad that it is not wise to knock a car to pieces on it). I would not recommend landing at Assab. From Kenya cars can be driven to Ethiopia in the dry season, but three points must be remembered; first, all roads in the Northern Frontier Province are closed as soon as the rains begin, to prevent the unmetalled surface being cut into ruts (this rule is inflexible). Secondly, in addition to a visa or immigration pass for Kenya, a special permit is required by anyone wishing to traverse the Province. This should be obtained in ample time. Thirdly, permission is only granted for cars travelling in convoys of at least two. Single cars must wait until

they can attach themselves to a trade lorry. All vehicles should if possible be fitted with extra petrol tanks or at least spare cans, and ample water should also be carried.

I shall describe the various groups of mountains from south to north, dealing only with those that approach or exceed 13,000 ft.

Maps are exceedingly inaccurate and all heights should be regarded as suspect. Nomenclature is confused owing to the different systems of transliteration used. I have followed the P.C.G.N. (Permanent Committee on Geographical Names) system of the Royal Geographical Society, sometimes inserting in brackets other variations, particularly Italian, often found on maps.

I. The Amaro Mountains

This range runs from north to south just east of Lake Chamo (Ruspoli). The highest peak Mount Delo, c. 12,500 ft., has not been climbed as far as I can ascertain. The range is difficult of access. It can be reached by taking a car down the exceedingly bad road from Dilla to Yavello and hiring mules either at Dilla or Aghremariam (Alge). The latter is the better as there are much frequented caravan tracks leading westward. Alternatively, drive from Yavello by an exceedingly difficult track westwards to Jarso (Giarso) and Gidole (Chidole, Gardulla). At either of these places mules can be hired, and the range reached via Burji, to which there is no motorable track.

I have seen the range from close by on both sides. It appears to have some rock peaks, but parties¹ who have visited it describe the higher summits as bare open downs, easy of access, with bamboo forests below.

There appears to be no mountaineering interest, but the whole region and the area of Konso (of which Jarso is the administrative capital) to the west is fascinating from an ethnological point of view and I wished I could have spent more time there.

II. The Gugu Highlands

This group, which also presents no mountaineering interest, lies to the west of Lakes Chamo and Abaya (Margherita). It has been fully explored by Dr. Hugh Scott, F.R.S., who, despite his advanced age, still continues his series of indomitable voyages in the remote parts of Ethiopia.²

¹ See the account of the second Borngi expedition, *L'Omo*, Vannelli and Gatti (Hoepli, Milano, 1899), Jensen, *In Land der Gule* (Streckker and Schroeder, Stuttgart, 1916). Hudson, *Some Years in Southern Abyssinia* (Fisher Unwin, 1927).

² *Proceedings of the Linnean Society of London*, Vol. 263, Part 2 (1952). This is also particularly valuable for the very complete references to publications covering this and other areas of Ethiopia.

From the south access can be gained to the range from Gidole where mules can be hired. A bad but motorable track runs north from Gidole along the lakes and then climbs steeply to Chench (Ciencia). This is a particularly lovely and interesting route. At Chench mules can be hired and the Sudan Interior Mission station would no doubt be willing to help.

From the north Chench can be reached by car via Shashamanna (Sciashamanna), Kolito (Colito), Soddu and Borodda. Alternatively, but this is much more difficult, a route can be forced to Soddu by leaving the main north-south road near Lake Zwai, between Mojo (Moggio) and Shashamanna, and proceeding via Hosanna.

III. The Batu Range

This group attracts me very much and I think offers possibilities. Unfortunately I have so far only been able to get to the western foot of it, but I have examined it from nearby and judge that it is of mountaineering interest. What is more important is that I can find no record of any European party entering the range, so there is the possibility of some real exploring, which should of course be combined with botanical, zoological and other scientific work. Arnold Hodson and the Duke of the Abruzzi¹ both skirted the area, without, however, penetrating the range, which is heavily forested to quite a high level. Goba was recently visited by a member of the British Embassy staff who reported that the track was very bad indeed in places and that the rainfall is heavy. The best months, January and February, are days through which the cold is intense.

The easiest access is by a motorable track eastwards from Shashamanna via Kofole (Cofole) to the Ford over the Wabi Shebeli and then over a high spur to Goba (ca. 9,500 ft.), which is close enough to be a good base for Batu. Mules are available. The height of this peak is given as 14,127 ft., which places it second only to the Simen peaks (see IX. below) in altitude in Ethiopia. From the latest indications there seems much doubt whether the name Batu is applied by the locals to the highest summit.

Alternatively the Wabi Shebeli crossing can be reached by leaving the main road east of Addis Ababa at Adama (now often known as Nazareth) and driving south to Aselle. Here a bad but motorable track continues southwards over the Karra (Carra) pass to the crossing.

Access to Goba from east or south is an even more formidable business.

¹ See Hodson, *op. cit.*; and Luigi Amedeo di Savoia, *Alle sorgenti dell'Uadi-Uddi Sobeli* (Mondadori, Milano, 1952).

IV. The Kakka (Cacca)-Chilalo (Cilalo) Group

This group can be attained by either of the two routes mentioned in the preceding paragraphs. It has been fairly often visited, though little climbing has been attempted.¹

The highest peak, Kakka, presents no mountaineering difficulties. Indeed I think I could have almost got my mule to the top. The lower peak, Enkuolo (Encuolo) on the other (east) side of the Karra Pass looks more interesting, but time did not permit me to try it. The heights are particularly suspect here. From my own observations I would give Kakka about 14,000 ft. and Enkuolo about 13,500 ft., both higher figures than those given on most maps. The northern part of the group (Chilalo) is lower and often heavily wooded. It is of interest botanically and zoologically, but not to the mountaineer.

The foregoing mountains all lie south of the Hawash River, which can roughly be considered the boundary between southern Ethiopia and the central highlands, where the remaining groups are situated.

V. The Chokké (Ciocche) Highlands

This group is of no mountaineering interest and I know of no complete scientific account of it. Some details are given in the report² of the Duchesne-Fournet mission. I have seen the range close by from the air; it is a long high rounded ridge and those who have visited it found it intensely cold. The Sudan Defence Force crossed these highlands in 1941 from Debra Markos northwards in pursuit of the fleeing Italians and, being lowlanders and ill equipped, suffered seriously. This did not, however, prevent them from fulfilling their task with conspicuous success. The highest summit according to the map is 13,353 ft., just above the pass.

Access is by Debra Markos, which can be reached from Addis Ababa by a motorable road, fair as far as the Blue Nile gorge and poor thereafter. There is now no motorable track over the Chokké Highlands from Debra Markos to Mota and mules would be required. The motorable track continues from Debra Markos via Dangila to Bahar Dar at the southern end of Lake Tana. This route from Dangila onwards was followed by His Imperial Majesty the Emperor in his advance from the Sudan to Addis Ababa in 1941 with "Gideon Force" under Wingate and with some Ethiopian troops. There is as yet no motorable track

¹ See Luigi Amadeo di Savoia, *op. cit.*; Scott, *Proceedings of the Linnean Society of London*, Vol. 110, page 42 (1926-7); and Meydon, *Sierra de Hailu and Akyra* (Widener, 1925).

² See Froidevaux, *Mission en Éthiopie* (Maison, Paris, 1909).

round Lake Tana on either east or west. It is probably possible to drive by Land-rover from Bahar Dar to Mota.

The Chokké area has the reputation of being rather disturbed and permission to enter it might not be readily obtainable.

VI. The Highlands between the Blue Nile and Dessie

This is one of the least travelled districts of Ethiopia and I know of no accounts of it. I have flown over in an R.A.F. aircraft at what seemed to me an uncomfortably low height and could see little to interest a mountaineering expedition, though there are some stupendous gorges. One peak south of Dessie is given 13,123 ft. on the map; the rest are lower. This peak is marked as Abuia Mieda, but there seems some doubt whether the name is properly attributed. Others have applied it to another peak near Abuna Yosef (see VII. below).

Access to these mountains would probably be best from Dessie and a route could no doubt be made by mule to Ajibar (Agibar) and Debra Markos.

Ajibar was the scene of a remarkable incident in 1941 when 120 Sudanese under British officers and a few Ethiopian irregulars, after a relentless pursuit of infinitely superior forces finally induced 1,100 Italians and 7,000 native troops with artillery to surrender.¹

VII. The Peaks above Lalibela

The highest of these, as already mentioned, is Abuna Yosef, to which an altitude of 13,743 ft. is attributed. A lower summit to the east is said to rise to 13,481 ft. It is not absolutely certain that these summits, which appear to be easy of access, have been climbed, but the neighbourhood has been often visited, particularly by Raffray² and it is highly improbable that they have not been ascended. They hold no mountaineering interest.

Most travellers come to Lalibela to see the fabulous rock-cut churches which have now been often described.³

The best approach to Lalibela is from Waldia on the main road a few miles north of Dessie. Here mules and experienced guides can readily be hired. It is possible to continue westwards to Debra Tabor and Gondar.

¹ See Allen, *Guerilla Warfare in Ethiopia* (Penguin, 1945). This is a valuable book, not only for the history of a little known campaign but because of the light it throws on conditions of travel and general atmosphere. Much holds good today.

² See Raffray, *Abyssinie* (Pion, Paris, 1930).

³ See for instance, Monti della Corte, *Lalibela* (Società Italiana Arti Grafiche, Roma, 1940); and David Burton, *Travels in Ethiopia* (Dent, 1946). This little book gives an admirable glimpse of Ethiopia and is illustrated by excellent photographs. It should be prescribed reading for any visitor to the country.

VIII. The Guna Uplands

The route mentioned in the previous sentence leads across this high open ridge, which holds no interest whatever for mountaineers. The track actually traverses the highest point, which is given 13,881 ft. on the map.

It should be noted that the road marked on most maps as leading from Gondar via Debra Tabor and Magdala to Dessie is not motorable for most of its length. It was damaged by demolitions in 1941 and for the most part has not been repaired. It is motorable from Gondar to Debra Tabor, but beyond that is now only a caravan track. Even Magdala, the scene of Napier's victory over the Emperor Theodore, cannot be reached from Dessie by car.

IX. The Mountains of Simen (Semien)

Sometimes in older books Samen. The latter is incorrect and due to confusion by Europeans between two Amharic letters. Simen means "north".

This is the culminating group of Ethiopia and well worth a visit, because of its extraordinary nature. It can, however, hardly be called a mountaineering objective, as most of the high summits can be reached by mule. This is, however, not to say that there is not a profusion of magnificent rock climbing—on rather treacherous basalt—either on the huge faces of the cliffs or up lofty isolated pinnacles of horrific aspect. Such climbing can be found in many places in the north of Ethiopia and in Eritrea, where fine rock peaks, some of them apparently very difficult, abound. There are for the most part no records of any ascents of these mountains, which, though minor in comparison, are all over 10,000 ft. I cannot, however, feel that they would justify an expedition from Europe. In future years they will, I hope, be the magnificent playground of a local mountaineering club, using the latest artificial techniques, including nuclear propelled rope-carrying rockets and radioactive pitons.

The topography of the Simen group is more complicated than in the usual Ethiopian ranges and the absence of a reliable large scale map makes itself felt. Here is a sufficient inducement for an expedition, which should of course also set itself other scientific tasks.

It should be repeated that there are no permanent snows and no glaciers on Simen. In early historical times there was certainly heavy snow as we know from the records, and it was reported by Salt and his companions 130 years ago. Since then, however, the climate of the world has grown warmer, as is witnessed by the retreat of glaciers in the Alps and the Ruwenzori. Heavy hail storms are, however, frequent, usually in the afternoons, and hail may lie for a long time in sheltered places. Even in Addis Ababa at 8000 ft. I have known it to persist in the shade for more than a day.

The most easily accessible sources known to me for Simen are Jeannel¹, Maydon² and a guidebook published by the Consociazione Turistica Italiana³. I strongly recommend the potential visitor to consult all three. Dr. Scott has also recently visited the range, but the result of his work has not yet been published. The Linnaean Society of London would state when publication had taken place.

The highest summit of Simen is Ras Dashan (Dascian), which is often locally pronounced Dejen. The Italian military expedition, recorded in *Africa Orientale Italiana*, was passionately anxious to produce a 5000-m. peak in what was then Italian overseas territory and ingeniously contrived to discover that Ras Dashan was 5005 m. (16,564 ft.). The height accepted on most maps is 15,153 ft., but a recent German party, which took careful aneroid observations, arrived at a mean of only 4570 m. (14,434 ft.). I suspect that they are more likely to be correct. If the mountain were well over 15,000 ft. there would almost certainly be permanent snow at this latitude. In addition to Ras Dashan there are several other peaks over 14,000 ft. All, except for isolated pinnacles, seem easy of access.

The best approach to the range is from Asmara via Axum and the road running south-west to Gondar, which was built for military purposes by the Italians. Both scenically and as an engineering feat it is one of the most magnificent I know in a country of remarkable roads. It crosses the deep rift of the Takazze River and rises to Addi Arkai, which the Italian party used as a starting point for the mountains. Further on there are wonderful views of the startling lower peaks, reminiscent of the wilder Dolomites in shape, but not in colour. There follows the astounding ascent of the Wolkefit (Uolcheft) Pass, which rises from 3700 ft. to 10,500 ft. in 21 miles of breathtaking road. Just beyond the crest lies Debarek, which is the best starting point for the mountains.

As the crow flies the distance from Debarek to Ras Dashan is not more than 35 miles, but five days must be allowed because the caravan track traverses immense gorges, where mules can only progress slowly. A point to remember is that these high ridges are very waterless and what supply there is, is often of dubious quality. Ample should be carried. The route leads over or close to many other lofty peaks, notably Buahit, which is probably the second highest in the group. The caravan track continues beyond the pass close under Ras Dashan, dropping down to the Takazze and thence to Axum. I know of no European party that has followed this route beyond Ras Dashan, which, while presenting no difficulties should prove scenically spectacular.

¹ Jeannel, *Hautes Montagnes d'Afrique* (Editions du Muséum, Paris, 1910). This concentrates on flora and fauna, but geology is dealt with. It only deals with Ethiopian mountains north of the Hawash river (except for an addendum by Professor Scott on Chibalo). Its main importance attaches to the great massif of Tanganyika, Kenya, Uganda and the Congo. It is however most valuable for references.

² *Op. cit.*

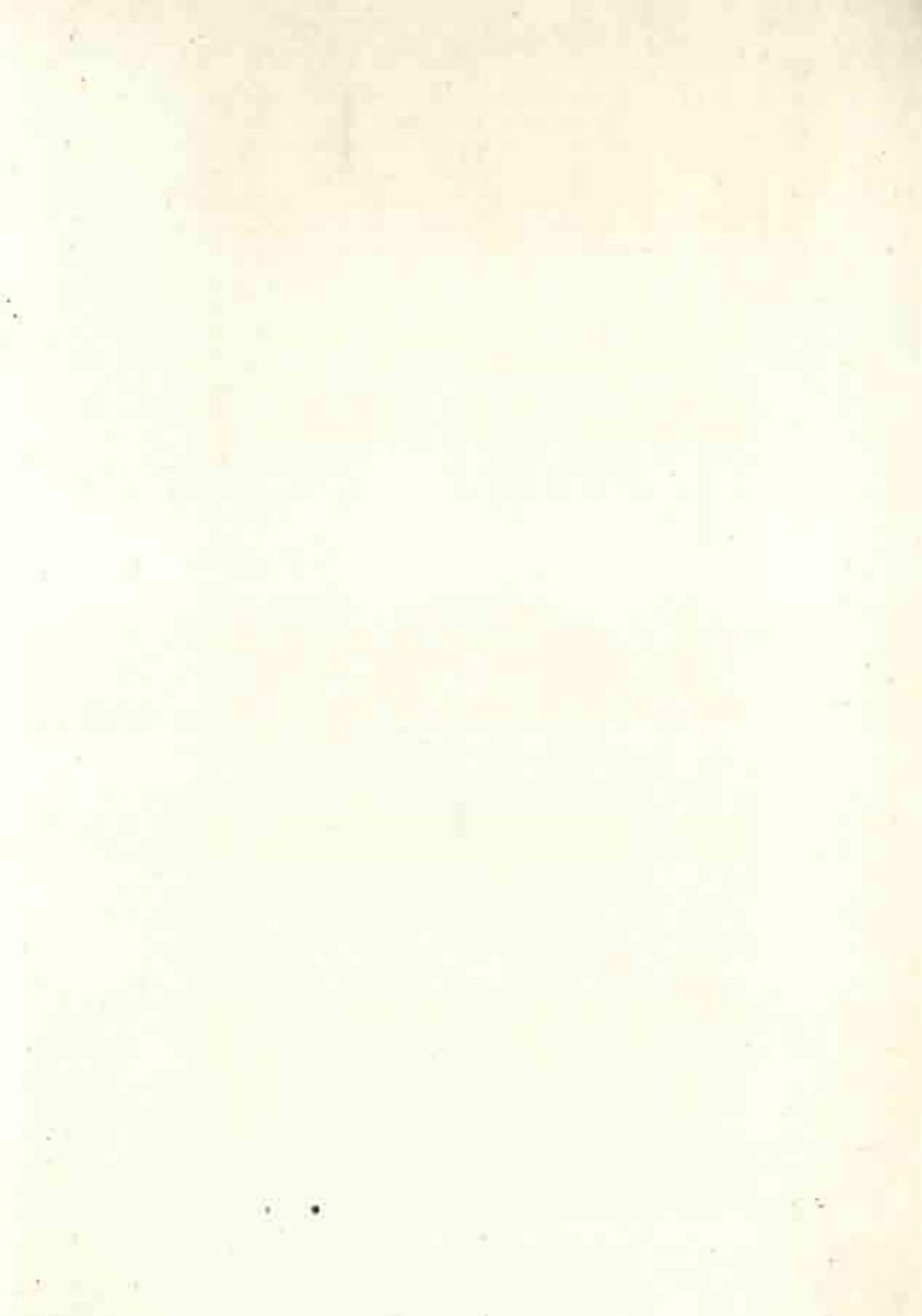
³ *Africa Orientale Italiana* (Milan, 1938). This is of course out of date and must be used with great caution where such matters as roads, hotels, etc. are concerned. It is, however, a painstaking work and even now most valuable.

Another route of access is from Dabat, on the road 17 miles south of Debarek, thence due east to Derasgie and north to the mountains.

Dabat and Debarek can, of course, be reached from Gondar to the south, but, as already mentioned, there is no motorable track from Gondar round Lake Tana to Bahar Dar and Addis Ababa. I have floated vehicles across the lake, but it was a hair-raising experience and I do not recommend it.

The Simen mountains are rather a closed area and any party, even if coming from the north should drive through to Gondar to call on the Governor General to obtain the necessary permits and recommendations to the local authorities at Debarek. Care should be taken to get a permit to take photographs, since in this remote region cameras are sometimes objects of suspicion. The Simen ibex (Walia), which exists nowhere else, is now protected and permission to shoot one is most unlikely. A police escort will certainly be provided and would be very useful in dealing with mulemen, local inhabitants, etc.







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